UNITED STATES ARMY

AVIATION DIGEST

MARCH / APRIL 1992

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AVIATION DIGEST

PROFESSIONAL BULLETIN

1–92–2 ▪ MARCH/APRIL 1992

1 **Aircrew Coordination,** MG Dave Robinson

3 **Views From Readers**

7 **The Army—Where We Are Going and How We Are Getting There!** LTG Dennis J. Reimer

10 **New Direction for the Aircrew Training Program,** CW4 James Winston

14 **ASET II Programmed for All Aircraft,** Dr. Elizabeth Plumb

16 **Commander's Task List,** CW4 Richard M. O'Connell

19 **Maintenance Test Pilot Standardization,** MAJ James A. Fitzpatrick and CW4 Ronald S. Marchman (retired)

22 **The Nonrated Crewmember Standardization and Training Program for Utility and Cargo Helicopters,** SFC Robert D. Hagen

28 **Night Vision Goggles Training Update,** MW4 Robert A. Brooks

30 **Training Scenarios,** MAJ William L. Gillen, CPT Mark Evetts, and CW4 Chris Wareham

32 **Aviation Logistics Mobility,** 1LT Gregory K. James

37 **Army Chief of Staff to Present Ellis D. Parker Award Annually to Best Aviation Battalion,** LTC Gerard Hart

38 **What is the SPH-4B?** MAJ Richard M. Carter

42 **Helicopter School of the Americas,** LTC Jose L. Hinojosa

44 **Where do we go from here?** Mr. Eugene H. Grayson

48 **The "Bag," An Exercise in Mental Gymnastics,** CW3 Ken Shannon

51 **DES Revises CH-47D Operator's Manual and -CL,** Mr. Stephen M. Harris

54 **TEAC By The Book,** MAJ James Fitzpatrick, CW4 Peter Dorpema, CW4 James Jegel, and CW4 William Shumate

58 **Aviation Personnel Notes: Aviation Drawdown**

59 **USAASA Sez: Improving FLIP,** Mr. Richard T. Johnson

60 **PEARL'S: Proper Food Preparation; Hypothermia; Air Bathing**

61 **Aviation Medicine Report: Dustoff Black Hawk—The UH-60Q,** LTC R. (Huey) Huether

62 **AVSCOM: Army Oil Analysis Program in Wartime,** Mr. Richard A. Cardinale and Mr. John S. Glaeser

63 **TEXCOM: MATTAX,** Mr. John L. Brady

64 **ATC Focus: ATC Maintenance AMF To AMSF,** Mr. Jack Zornes

65 **Soldiers' Spotlight, Arming the AH-1S Cobra,** CSM Jack H. List

Cover: **This issue of the Aviation Digest is devoted to the Aircrew Training Program (ATP). It focuses on the new TC 1-210, *ATP—Commander's Guide to Individual and Crew Training*, the capstone manual commanders will use to develop their ATPs. The cover montage by Judy Smith shows the various training programs associated with the ATP. Starting on page 10, the lead story describes the new direction for the ATP.**

Back Cover: **50th Anniversary of Army Aviation**

Major General Dave Robinson
Commander, U.S. Army Aviation Center

Lieutenant Colonel Gerard Hart
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Major General Dave Robinson

Aircrew Coordination

For 50 years we have trained some of the best pilots in the world. In earlier times, aviators were trained mostly for single-pilot operations. Flying was somewhat easy; the L-19 Bird Dog and H-13 Sioux were forgiving aircraft, and the mostly daytime mission profiles were not too complex. Our standardization methods and checkride regimes were single-pilot oriented. We retained this orientation with the OH-58 Kiowa and the UH-1 Iroquois. As the fleet was modernized with AH-1 Cobra, OH-58D, AH-64 Apache, UH-60 Black Hawk, and CH-47 Chinook aircraft, single-pilot perspectives diminished. However, we had much to learn about crew operations in a modernized fleet. Today, a single pilot's mentality runs counter to the demands of complex, combined arms mission profiles and the high-technology systems we operate and maintain.

Unfortunately, as tasks multiplied in the cockpit and environmental hazards increased, so did our accident rate. As early as 1973, the U.S. Army Safety Center identified problems in the ability of crewmembers to coordinate their actions. In a subsequent study of Class A aircraft accidents from 1983 to 1989, crew coordination failures steadily increased primarily because of more complex mission profiles and expanding night flying requirements.

A recent example of this phenomenon is Operation Desert Storm. Only 17 percent of our flying was done at night, yet 68 percent of rotary-wing accidents occurred during the hours of darkness. Most of these accidents involved aircrew coordination failures. Why? There is strong evidence that peripheral vision is involved. During day operations, we have full vision capabilities. At night, our vision is limited peripherally, and important cues are missed. As we operate closer to the ground without sufficient visual cues, crew coordination becomes essential. When operating complex mission equipment packages in demanding operational environments, two sets of eyes and the brain power of two individuals is much better than one.

So how do we improve crew coordination? For many years, most military flight programs adopted civilian aviation's solution to the problem—Aircrew Coordination Training (ACT) and Cockpit Resource Management (CRM) training. The ACT and CRM programs were developed for civil aviation situations in which most of the mission profile was at high altitudes. Cooperation in the cockpit was based on using crew discussion in the decisionmaking process. While this approach has value, it only partly addresses the Army's tactical flying needs.

Army Aviation's mission profiles are flown in the ground regime; obstacle hazards and the challenges of partial and sometimes total obscuration confront even the most capable aviator. In flight, decisions must be made quickly, which calls for crew response to be nearly automatic.

Many aviation field commanders have been working on crew coordination matters for sometime. Battle rostering and special training programs have been used in units. However, the Army has not institutionalized its concern for the total

L19 Bird Dog

OH-13 Sioux

OH-58 Kiowa

UH-1 Iroquois (Huey)

AH-1 Cobra

AH-64 Apache

UH-60 Black Hawk

CH-47 Chinook

crew concept. In response to this need, the U.S. Army Aviation Center has been drawing on field experience, our standardization personnel, and information from other services to revise completely the aircrew training program. We recognize that good crew coordination begins at the school house in primary training. Our training philosophy has moved from single-pilot operations to the total crew concept. This concept requires everyone to be responsible for specific tasks and share in the total operation of the aircraft.

To do this, crew coordination requirements are being integrated into the tasks, conditions, and standards of the aircrew training manuals. The goal is to take the guesswork out of duty assignment. Each crewmember is responsible for properly executing assigned duties while understanding the actions and directives of the other crewmembers. The new program also standardizes communication techniques to help eliminate ambiguity and confusion in the cockpit.

While a certain degree of flexibility is justified by the fluid nature of tactical flying, standardization is key to consistent behavior in the cockpit. We can no longer afford to assume that the other crewmembers know what to do and when to do it. Assumptions too often result in catastrophe.

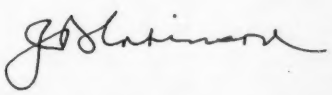
Where do the subtle dimensions of human behavior fit into the cockpit team? We do not yet fully understand, nor do we have a vehicle to measure the impact of personality on mission accomplishment. We do know that to facilitate cooperation and coordination, commanders need to battle roster crews. While many of you probably just cringed, battle rostering does not mean a crew must fly together every flight. Keep in mind, however, familiarity with coworkers builds stronger team ties and opens channels of communication. Battle rostering also improves the crewmember's performance at a specific station.

As for risk management, a well-trained, cohesive crew will have a much lower risk factor than a newly formed or ad hoc crew, because communication breaks down the barriers that inhibit effective cockpit coordination. There will be risk tradeoffs to deal with along this road of individual, crew, and collective training. Commanders will need to consider the added risk involved when integrating new crewmembers during either complicated missions or adverse environmental conditions.

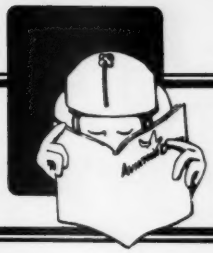
Challenging and innovative training is planned activity that focuses on team performance. Don't limit your concept of a crew to just the aviators on board the aircraft. Crewchiefs, flight engineers, and aerial observers must be a part of the training process, if crew coordination is to be optimized. Crew coordination procedures must be implemented during day operations first to expedite safely positive habit transfer; this is the crawl, walk, run approach to training.

Establish creative simulator training programs to teach and confirm crew coordination skills. Skilled standardization instructors can learn much about a crew by watching crew drills in the simulator. Crew skills in day operations and in the flight simulator should be affirmed before taking on the more complex night environment.

I am proud that Army Aviation has consistently produced the best individual helicopter pilots in the world. Without losing that individual advantage, it is now time to develop crews with the same skill and expertise needed to match the complex requirements of our mission profiles. Synergism is the key—combining individual elements to optimize their effectiveness. By implementing crew coordination training, we will become safer, more efficient, and more lethal warfighters.



VIEWS FROM READERS



Editor:

I read with great interest the article, "The Professional Noncommissioned Officer," in the November/December 1991 issue of the ***U.S. Army Aviation Digest.*** Congratulations to Captain Jennifer L. Peeples on being one of the first to identify that, though we use the word "professionalism" in describing the Noncommissioned Officer (NCO) Corps, sociologists, and others within academia do not.

In an articulate and concise piece, the author makes a strong case for inclusion of NCOs within the elite grouping of officers, teachers, doctors, lawyers, and others recognized as professionals.

However, I have noticed that some sociologists add professional journals to their criteria for what constitutes professionalism. Such publications, open forums for the exchange of ideas, are all common to the groups listed above. Perhaps that is why former Army Chief of Staff General Carl E. Vuono made the establishment of ***The NCO Journal*** such a high priority. In less than a year, ***The NCO Journal*** has already made a great impact on the U.S. Army as a whole, and brought renewed pride to an already distinguished Corps of NCOs.

Hopefully, fine articles like "The Professional Noncommissioned Officer," and professional leader development forums such as ***The NCO Journal,*** will convince even those in ivory towers that we have an NCO Corps that has not only earned the right to be called professionals, but sets the standards for professionalism.

Colonel Fredrick E. Van Horn
Commandant
U.S. Army Sergeants Major
Academy
Fort Bliss, TX

Editor:

The 1st Infantry Division 75th Anniversary Commemoration and Reunion will be held 7 and 8 June 1992 at Fort Riley, KS. Former members of the Division interested in participating may contact Major William B. McCormick, Public Affairs Officer, Building 405, 1st Infantry Division (Mech) and Fort Riley, Fort Riley, KS 66442-5000, phone DSN 856-3032 or commercial 913-239-3032.

Editor:

The 41st Defense Working Group of Nondestructive Testing (NDT) will be held 16 through 20 November 1992 at the Holiday Inn, Tucson, AZ. The working group is sponsored by personnel assigned to the U.S. Air Force, Headquarters (HQ), Aerospace Maintenance and Regeneration Center (AMARC), Davis-Monthan Air Force Base (AFB), AZ.

The meeting is held annually for all Department of Defense and Government activity participants who that have NDT responsibilities. The meeting has proven to be an excellent vehicle for the exchange of information, problem solving, and discussing new technology.

At this time, a call for papers presenting an NDT problem or technical paper by U.S. Government personnel and approved by the Steering Committee is being put out. Please submit any abstracts for technical and or NDT problem papers no later than 15 July 1992 to HQ, AMARC, Nondestructive Inspection Supervisor, ATTN: Mr. Paul Machado, Davis-Monthan AFB, AZ 85707-6201, phone DSN 361-3670 or commercial 602-750-3670. Questions also should be directed to Mr. Machado.

Editor:

I am one of those "well-intended" Vietnam-era pilots who transported casualties but in a medical evacuation (MEDEVAC) aircraft.

Though obviously incountry during a period of time that wasn't classified as "the bad ol' days," Dustoff was available everywhere during my time incountry; therefore, "self-transport" of casualties was not required.

I am not offended by CW4 Tuttle's statement in his "Views from Readers" letter in the September/October 1991 issue of the ***U.S. Army Aviation Digest.*** (Note: CW4 Tuttle's letter responded to two other "Views from Readers" letters;

i.e., Lieutenant Colonels Huether's and Geiger's in the May/June 1991 issue. Their letters were in response to the article, "Armed OH-58D Kiowa Warrior—The Multipurpose Light Helicopter," in the November/December 1990 issue.) However, I do offer some Dustoff/MEDEVAC history that states why some units transported casualties without calling Dustoff.

During the first 3 years or so of the Vietnam conflict, there were few MEDEVAC aircraft incountry, much less located near the action. Dustoff existed, but out of place, from early 1962 until sometime in 1965.

Early efforts by Captain (CPT) John Temperelli (commander, 1st Air Ambulance Detachment in Vietnam), Major (MAJ) Lloyd Spencer, MAJ Charles Kelly, and MAJ Patrick Brady, to name a few, were stifled by senior commanders. Commander Temperelli tried at every doorstep to bring MEDEVAC to the very location of hostilities and/or assaults. On several occasions, he volunteered to accompany assaults and was told "No."

On several occasions, other Army aviators argued against dedicating aircraft for MEDEVAC, and suggested putting removal red crosses on the MEDEVAC aircraft, which would allow them to be used for other missions. At one point, MEDEVAC aircraft were cannibalized and parts used for slicks and guns. Fortunately, CPT Temperelli prevailed in his attempts to keep MEDEVAC a pure mission.

When the 57th Medical Detachment (MedDet) arrived incountry in 1962, it had five UH-1A Huey aircraft. Continued efforts failed in distributing these 5 aircraft to just the right location to provide MEDEVAC. On one occasion, during a mission in the Delta, events turned sour. Four CH-21 Shawnee and one UH-1B were shot down. Repeated efforts by "slicks" to extract the wounded and downed aircrew were unsuccessful. The 57th MedDet was sitting in its assigned area at Nha Trang, Vietnam, far to the north. However, as the conflict widened and more troops arrived incountry, senior commanders requested and received more MEDEVAC units.

In 1964, five more MedDets received orders for Vietnam. In August 1965, an air ambulance platoon with 12 aircraft was assigned to the 1st Cavalry Division. They took the call sign "MEDEVAC," rather than Dustoff. In 1965 there were two more detachments assigned to Vietnam, each with six aircraft. The 498th Medical Company with 25 aircraft also arrived in Vietnam in 1965. The 45th Medical Company arrived in 1967 with 25 aircraft assigned.

The MEDEVAC operated, if that is appropriate to say, from 1962 to 1965 with little assets and literally no mission statement. During this period of time, CW4 Tuttle is absolutely correct, self-transportation of casualties probably was a necessity. It was better to try and get the injured to medical attention by any means. Without MEDEVAC assets available, no other choice was available.

However, after 1967, MEDEVAC had grown into a single, dedicated business, dedicated to the ultimate mission of trying to save lives anywhere, anytime. Procedures, mission statements, call signs, and full support from senior commanders were in place. From that time to the present, the mission of medical aircraft has continued to improve and grow.

MEDEVAC aircraft were not allowed to go into certain areas without "Cobras," to protect assets. As for that statement, "hot" areas were established with protective rules. That meant that some of these areas were so "hot" that sending in an unarmed helicopter alone was disastrous. Depending on the nature of the area, guidance would dictate how the MEDEVAC helicopter crews reacted. For a short period of time, the 45th Medical Company had a 10-grid square area that was off limits without gun cover. The 45th Medical Company had literally over 20 aircraft, in 20 days, shot up in this "hot" area. As conditions improved, this restriction was lifted. During another period of time, the 45th Medical Company would not allow hoist missions to be performed without gun cover, for obvious reasons. The aircraft is extremely vulnerable during hoist missions. This restriction, too, was lifted.

Naturally, some officers and even commanders may be disgruntled at the policies and doctrine of MEDEVAC. But, we must never forget the early years, "the bad ol' days," and regress to some form of operation that has proved to be less than satisfactory. Less than satisfactory means loss of life or limb for somebody.

Take offense? No. Learn something? Yes. Let the guns do gun work. Let the observation aircraft do observation. Let the MEDEVAC aircraft do MEDEVACs. Can some

of these be combined? Probably. Doctrine will dictate this. Obviously, troop transportation, observation, and even some shooting can be done from the same aircraft. However, the UH-60 Black Hawk can't do what the AH-64 Apache can, nor vice-versa.

Ask those who were lifted by us. And there were several lifted. Between May 1962 and March 1973, and estimated 850,000 to 900,000 casualties were transported by MEDEVAC. Especially after 1967, in most areas, standby crews ensured that literally no one was over 12 to 15 minutes from a MEDEVAC aircraft. Leave MEDEVAC to MEDEVAC. Given the opportunity, we would be there.

Credit for the statistics must be given to Mr. (formerly Major) Pete Dorlan and Mr. James Nanney and their book titled, ***Dustoff, Army Aeromedical Evacuation in Vietnam.***

CW4 Ronald H. Wells
1255th Medical Company (Formerly 45th Medical Company)
Mississippi Army National Guard

Editor:

The U.S. Army Field Artillery School (USAFAS), Fort Sill, OK, is adding the USAFAS Targeting Course to the list of fire support professional development classes. The program of instruction for the course was developed through a joint Field Artillery School and Intelligence Center effort with additional support from U.S. Air Force (USAF) and U.S. Marine Corps (USMC) liaison personnel at Fort Sill.

The course is designed to train selected officers from all services on the U.S. Army targeting process and targeting team operations at division and above levels. The course uses the Army's targeting methodology of "decide, detect, and deliver" as the basis for instruction. The intent is to produce officers who are knowledgeable of Army tactics, techniques, and procedures, thereby enabling them to more effectively synchronize targeting in a joint warfighting environment.

The USAFAS point of contact is currently managing the class fill manually. Requests for class seat reservations should be sent by letter or message to Commandant, USAFAS, ATTN: FSCAOD-WFD, Fort Sill, OK 73503-5000. The following information is required: Full name, rank, service, social security number, security clearance verification, and duty position.

Resident class instruction is limited to a maximum of 24 students. Student prerequisites for the initial classes are Active Army Combined Arms and Services Staff graduates, combat arms or combat support branch personnel assigned to or projected for targeting team duties; USMC captains or officers above that grade assigned to a Marine division or operational joint billet; or USAF officer Air Ground Operations School graduates assigned to division or corps tactical air control party or operational joint billet. A SECRET CLEARANCE is required.

The USAFAS resident instruction targeting course dates are as follows:

CLASS	REPORT	START	END
2-92	141700JUN92	15 JUN	26 JUN
3-92	021700AUG92	3 AUG	14 AUG
1-93	181700OCT92	19 OCT	30 OCT
2-93	241700JAN93	25 JAN	5 FEB

Field Artillery Targeting Course

Incoming students must report to the USAFAC and Fort Sill Billeting Office, Austin Hall, Building 5676, not later than report time above. Government meals and lodging are available. The course advance materials will be provided upon signing in.

The point of contact for the course is Major Donald G. Oxford, DSN 639-5323/5194.

Editor:

I read with interest the article, "Aviation Logistics: Aviation Apprentice Mechanic Program," by Sergeant First Class Dennis Cary in the September/October 1991 issue of the ***Aviation Digest*** concerning the concept of training an aviation mechanic in several disciplines. The U.S. Coast Guard (USCG) aviation community has, of necessity, "cross-trained" its mechanics for years. An armed service of the United States since 1790, it has always been small, but efficient, and is one of the best bargains the American taxpayer has ever received.

I am an aviation electrician currently qualified on the HH-65A Dolphin helicopter, and am stationed at the USCG Air Station Savannah, Hunter Army Airfield (AAF), Savannah, GA. I usually trouble-shoot electrical problems on the aircraft, but have helped change main gearboxes, engines, rotor-heads, tail gearboxes and rotor-heads, hydraulic pumps, and other engine and airframe items. I am qualified to inspect the repair work done on practically any part of the helicopter.

I am also a helicopter flight mechanic and hoist operator. Our safety record is enhanced by the fact that we "fly 'em and fix 'em." A mechanic who must fly on the aircraft he just fixed has quite an incentive to do a quality job. Most

VIEWS FROM READERS

Coast Guard HH-65A air stations have a "helo shop" that employs at least one of each aircraft "rate" military occupational specialty in addition to the normal complement of engine and airframe rates. This allows an avionics technician to get their hands dirty on an engine change, windshield replacement, tail rotor balance, etc. A metalsmith (sheetmetal shop worker) can impart knowledge concerning fuel cells, composites, proper hardware selection and installation, and can gain knowledge about the powertrain systems, etc. The electrician in the helo shop can provide insight to the engine mechanics about systems that affect engine operation, and can acquire hands-on experience with the engines and other systems.

The Coast Guard deploys HH-65A helos to Coast Guard cutters that have very limited repair facilities, and even less work room onboard. The knowledge of each of the three deployed aircrews must be broadly based for effective repairs to be made on the helo and keep it in a "up" status during the deployment. The practice of getting everyone involved in maintenance pays handsome dividends. Many Coast Guard avionics and electrician technicians acquire enough hands-on experience in their first couple of years' service that they easily pass the airframe and powerplant license examination, although their primary job may be "chasing trons."

The concept will work if it is allowed to work. Most people like the idea of being multitalented, and therefore able to make more of a contribution to the team. One reason I joined the Coast Guard was so I would not be "straitjacketed" into a narrowly-focused job description. I will be more marketable on the outside, and more useful to the team while I remain in the service. The inevitable arguments will emerge concerning "dilution" of people's talents, but that is a smokescreen against change.

Get on with improvement for your people, and for your service. The climate for change is very good now, since downsizing will allow for innovators to come forward and show their wares. Keep your future bright!

Petty Officer First Class David J. Kiser
USCG Air Station Savannah
Hunter AAF
Savannah, GA

Editor:

I am writing this letter in response to a July/August 1990 "Views from Readers" letter about why 93P Aviation Operation Specialists should be awarded the Aircraft Crewman Badge.

(Editor's Note: Department of the Army and U.S. Total Army Personnel Command messages about Aircraft Crewman Badge initially appeared in the January/February 1990 issue "Views from Readers" section.)

I disagree that anyone other than crewchiefs, flight engineers, door-gunners, and aerial observers should wear or be awarded the badge. In all other services the badge is reserved for flight crews only. It is only after proper aircrew training that one should be awarded the badge. Other ground personnel have another badge that recognizes their important job!

The Aircraft Crewman Badge is the only one I know of that, to earn it, you simply have to complete advanced individual training with a certain military occupational specialty. This is like being assigned to an airborne unit and wearing jump wings without ever going to jump school or having to jump out of an airplane.

SPC Brian Cashman
Crewchief/Gunner
H Company, 3d Aviation
APO New York

Editor:

From 19 through 20 June 1992, the 11th Armored Cavalry Regiment (Blackhorse) will hold its 23d Annual Reunion at Fort Knox, KY. The reunion is open to all Blackhorse Troopers; commissioned, noncommissioned, warrant officer, and enlisted personnel for any period of service.

For additional information write to Mr. Bill Squires, Secretary, Blackhorse Association, P.O. Box 11, Fort Knox, KY 40121, or call commercial 502-351-5738.

Readers can obtain copies of the material that is printed in any issue by writing to the Editor, U.S. Army Aviation Digest, ATZQ-PAO-AD, Fort Rucker, AL 36362-5042.

The ARMY–

Where We Are Going and How We Are Getting There!

On 13 February 1992, Lieutenant General Dennis J. Reimer, Vice Chief of Staff of the Army, was guest speaker to the American Helicopter Society, Fort Rucker, AL. This article includes excerpts from that speech.

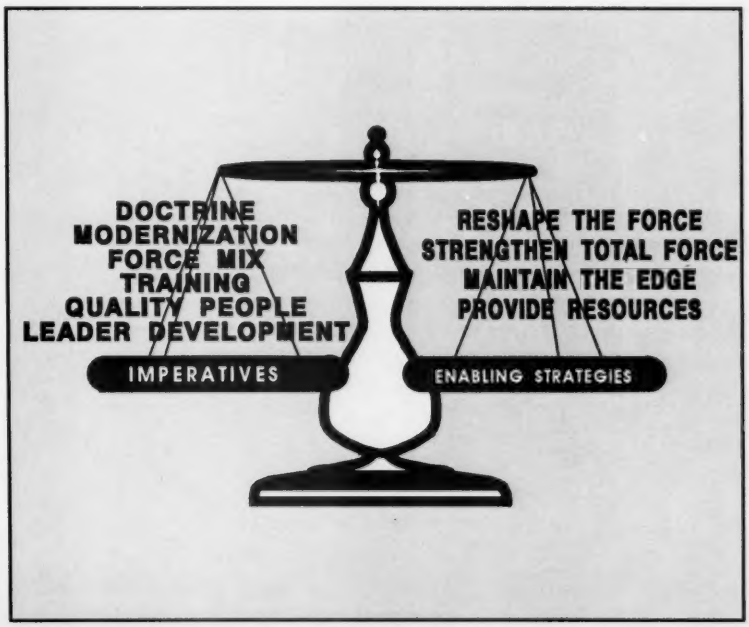
Army Aviation, an Essential Element in Three Wars

Today, once again we are the world's preeminent military power. Our Army, the Total Army, has been victorious in three wars in the last 2 years: the Cold War, Operation Just Cause, and, of course, Operation Desert Storm (ODS)—and Army Aviation has been an essential element in those victories.

Our Army's armed helicopters have a proud history, from the UH-1 Huey gunships of the 1960s in Vietnam to the venerable AH-1 Cobras, OH-58D Kiowas, and AH-64 Apaches in Just Cause and Desert Storm. Army Aviation has played a vital role in recent conflicts, contributing powerfully to the combined arms fight.

In our manuever-based doctrine that pits strength against weakness, Army Aviation gives us a significant advantage in agility and in increasing the operating tempo. It is an integral and critical part of our force in both a combat and a support role. This was shown across the board during ODS where, for example, the Apache fired the first shots of ODS as it lethally surprised and eliminated Saddam's key early warning nodes and opened the door to Baghdad.

Army airpower went on to provide the decisive edge in the ground war and assure its role in the future. We conducted warfare in a new, more exact, more sophisticated way; we elevated it to the Ph.D. level, fighting in four dimensions. It was precise, swift, lethal, and overwhelming. Combat will never be the same. On the battlefields of tomorrow, the strengths Army Aviation brings to the force will be even more important.



Enabling Strategies

The six fundamental imperatives— we must keep doctrine, quality people, training, force mix, modernization, and leader development

The ARMY

in balance—will remain our guide, but as leaders we must concentrate our efforts in four broad areas, **enabling strategies**, that encompass different aspects of the imperatives.

First, we must **maintain the edge**. America's Army must remain trained and ready. We cannot rest on our laurels, nor can we cut back on the intensity of our training. It is that intense training that gave us the edge in the Gulf and saved American lives. However, readiness is relative and a moving target. Our task is to reshape the Army while maintaining readiness. The Army of today must be adequate to deter or defeat the threats of the next century. And we must ensure that we continue to deny our potential adversaries the initiative at any level of conflict. This requires that we push the standards of each of the imperatives forward across all aspects of the Army.

We have the technological advantage and it has paid off; we need to maintain it. Given the coming constriction in resources, there is no element in the overall defense effort more important than an energetic and well-focused, long-term research and development (R&D) program. We are seeing this played out in the new budget.

We had planned to begin assembly-line production of the RAH-66 Comanche helicopter in the next several years. The proposal now is that the program be limited to completion of a technical demonstration model. This is today's reality. I see this as both a burden and an opportunity for our contractors. Industry needs to build prototypes that are so superior and so convincing that they build the case for procurement. This will benefit us all.

We also are seeing other initiatives such as our team in Europe talking with the Germans and the French about possible participation in the Comanche program. We may see more of this in the future as we look for bigger production runs to keep unit costs down and programs afloat.

A major concern in this area is compensation for R&D. As Deputy Secretary of Defense Donald J. Atwood explained during recent

Army Aviation has played a vital role in recent conflicts,contributing powerfully to the combined arms fight.

budget hearings, the method of contracting with industry has either encouraged them or they've encouraged themselves to buy in on the R&D phase, always betting in the back of their mind that they could get well in production. We need to be sure that when we contract with industry on R&D programs that they have an opportunity to make an equitable return on their investment and a reasonable profit.

Secondly, we must **reshape the force** to best accommodate the national military strategy. We have a plan to reshape the force: Go from the 28 divisions that we had down to 20 divisions; go from 1.5 million personnel to 1 million uniformed personnel.

Our civilian strength will go from approximately 400,000 to 300,000. This is a tremendous amount of change. This will result in an Active Component (AC) strength of 12 divisions and 535,000 personnel and a Reserve Component (RC) strength of 6 divisions and 550,000 personnel. Additionally, we will have 2 cadre divisions; where they will be has not yet been determined. This mix of forces will ultimately give us a solid Army to successfully protect the vital interests of our nation.

Reconstitution will be required in case of the emergence of a major threat to our security. The same will be necessary of our supporting industries. Fiscal realities will force correctly sized production facilities, eliminating spare capacity for surge/mobilization requirements.

We will most likely have to rely on commercial industry. This requires planning to obtain components from commercial production lines—meaning tomorrow's systems will need to be designed with commercial parts. We are going to have to work acquisition reforms to make this happen.

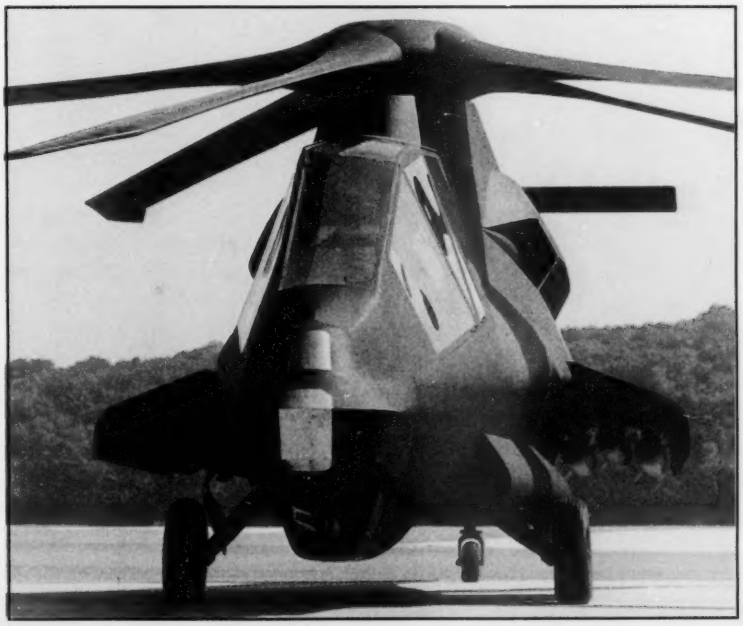
Thirdly, we must ensure that we properly **provide resources** for the force. We have to put our money in the places and activities that preserve quality and readiness. We have some things that came out of ODS that we must fix. And, we must continue our modernization, although not in the same way we pursued it in the past. Our current budget is about $70 billion. In the near future the years are going to be difficult, and 1994 has not been decided yet. I think it is important to note that by 1995 only 16 percent of our Federal budget, 3.4 percent of our gross national product (one third less than the world average), will go towards defense, the lowest since 1940. We are going to have some significant challenges in this area.

This means we are going to have to do things smarter, better, and cheaper...be more efficient—this translates into things such as reduced maintenance requirements and reduction of the logistics tail. We will need push quality. Quality translates not only into cost savings and efficiency, it most importantly translates into saved lives, the lives of our forces, and the people they protect. We are looking at moving toward commercial and international specifications. And, we are looking to change some business practices to benefit government and industry.

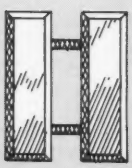
Specifically, in light of the current budget proposal, we will need to review OH-58D Kiowa and AH-64 Longbow Apache and make some adjustments. We must maintain the ability to perform the basic mission of defending the nation's vital interest. We are committed to protecting the essence of the Army.

And finally, the need for readiness in an era rife with uncertainty demands that we **strengthen the Total Army**, civilian and military, AC and the RC. We need to ensure that all personnel of our Total Army are totally involved with their job, understand where the Army is heading, and are doing their job the best they can. The need for the true Total Army is more critical than it has ever been.

Industry needs to build prototypes that are so superior and so convincing that they build the case for procurement.



TC 1-210
Commander's Guide
to Individual
and Crew Training



New Direction for the Aircrew Training Program

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Army Aviation's future direction for training aircrews departs from the current focus on individual training to place more emphasis on training and evaluating each crew's ability to work together as a team. The future changes affect crew training; battle rostering; crew evaluations; FAC 3 positions; risk assessment; NVG; and fratricide. Aviation unit commanders expect to make crew training as successful as individual training.

The new Training Circular (TC) 1-210, *Aircrew Training Program: Commander's Guide to Individual and Crew Training*, is the capstone manual for aviation commanders to use in developing their aircrew training programs (ATPs).

TC 1-210 is used with aircrew training manuals (ATMs) to meet individual, crew, and mission requirements. The ATMs are guides that give Army aviation a standard framework for individual and crew flight training programs after initial training. The Commander's Guide and the ATMs govern the ATP.

Several significant changes are projected for the ATP this year. The goal of the ATP is to develop cohesive, combat-ready aviation units. The direction of Army Aviation will help accomplish that goal.

By the end of this year, the Commander's Guide and all ATMs will be revised to reflect the new direction. The Commander's Guide, already sent to the U.S. Army Training and Doctrine Command, Fort Monroe, VA, is scheduled for fielding in June 1992. The ATMs should be fielded by the end of fiscal year (FY) 1992.

TC 1-210, the Commander's Guide for Individual and Crew Training

The new Commander's Guide refers to FM 25-100, *Training the Force*, and FM 25-101, *Battle Focused Training*. These manuals provide guidance on designing, implementing, and evaluating a training program. The guidance can be tailored to meet training requirements unique to aviation units.

The common denominator in all training techniques is training to meet the unit's mission essential task list. The training must link individual, crew, and collective training to accomplish the tasks in the mission essential task list.

Many commanders have already put some of the new concepts into their unit standing operating procedures. However, to provide a standard throughout the Army Aviation community, the revised commander's guide will include more specific guidance and regulatory requirements than did TC 1-210, *ATP: Commander's Guide*, published in 1986.

Along with a new title, significant changes will affect the way units are trained.

Major changes include the following—

Shift of focus from individual to crew training. The Commander's Guide published in 1986 and past ATMs have focused on the aviator. To complement the existing excellent individual training program, the next logical step is to focus on training the entire crew to work as a team.

This will bridge a long-standing gap between individual and collective training. TC 1-210 and the revised ATMs will link the ATP with collective training found in field manuals, Army Training and Evaluation Program mission training plans, and other doctrinal material for combat training.

Crew coordination training. Crew coordination is the communication between crewmembers and actions taken in proper sequence to perform tasks efficiently, effectively, and safely. Lack of good crew coordination has contributed to fatalities and costs millions in damages during the last several years.

The goal in developing crew coordination is to increase mission accomplishment and reduce accidents. Beginning with TC 1-214, *ATM: Attack Helicopter, AH-64*, all ATMs will be revised to reflect this concept to increase mission accomplishment and decrease accidents.

The task descriptions in the ATMs will be rewritten to specify each crewmember's part in performing the tasks. TC 1-214 is the first manual to be printed with the approved format for ATMs.

This emphasis on a coordinated team effort should satisfy both safety and training requirements for the ATMs. To help begin the new concept as soon as possible, the academic and flightline instruction syllabus at the U.S. Army Aviation Center, Fort Rucker, AL, is also being revised to include crew coordination training.

Battle rostering of crews. Crews who consistently fly together develop better cockpit coordination and are therefore less likely to have accidents. Battle-rostered crews include not only aviators, but also flight engineers, crew chiefs, aerial observers, aerial fire support observers, and medical observers.

Battle rostering does not mean these individuals must fly exclusively with each other on every flight. However, to be crew qualified, they must fly mandated crew iterations and pass evaluations as a battle-rostered crew.

Crew evaluations and tracking of commander-designated tasks. After progression to readiness level (RL) 1, the aviator begins crew progression from crew readiness level (CRL) 2 to CRL1 with the battle-rostered crew. Once designated CRL1, the crew must perform and track the prescribed iterations of the commander-designated crew tasks annually.

Aircrew Training Program

Besides to individual evaluations, an initial CRL1 evaluation is required. The battle-rostered crew will then be evaluated annually from the date it becomes CRL1. Battle crew evaluations will focus on coordinated crew performance of selected commander-designated crew tasks.

Addition of flight activity category (FAC) 3 positions. It takes a staff officer about 5 hours away from normal duties to get 2 hours of flight time. A third FAC was created for key staff individuals who have duties so important that any frequent absence away from work hinders the unit mission.

FAC 3 aviators have no aircraft hour requirements but must maintain simulator minimums, a current flight physical, current instrument qualification, and a current —10 exam.

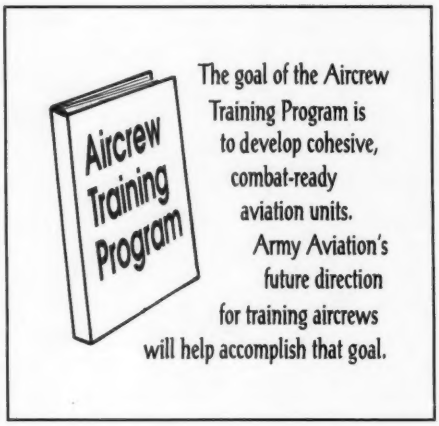
Risk assessment. An intense training environment stresses both soldiers and equipment, creating a high potential for accidents. The potential for accidents increases as training realism increases. An accidental loss, whether from training or war, is no different than a combat loss. The asset is still gone.

With this risk assessment chapter included in TC 1-210, more emphasis is placed on assessing the risk associated with Army Aviation's highly realistic training environment. A work sheet is provided to help the commander assess risk based on individual, crew, weather, and mission variables. Battle-rostered crews will have a more favorable risk assessment than nonbattle-rostered crews.

Night vision goggles (NVG). The publication of TC 1-210 and the revised TC 1-209, ATM: Observation Helicopter, OH-58D, means aviators will no longer use Field Circular (FC) 1-219, which is the ATM for NVG. TC 1-209 is scheduled for fielding in FY 1992-93. Putting the NVG chapter in the new Commander's Guide fills the gap left by the outdated FC 1-219. This addition also puts numerous references and messages into a single source for NVG use.

Fratricide prevention. Two reasons have significantly increased the likelihood of fratricide: emergence of weapons that permit engagement of targets at extended distances and increased use of allied equipment by hostile nations. However, taking advantage of unique night and NVG skills, and ability to operate under reduced visibility, reduces the possibility of any adverse consequence that could occur from friendly fire.

For these and other reasons, antifratricide training should be one of our highest priorities in Army Aviation. As fratricide prevention doctrine evolves, changes will occur in TC 1-210.


Aircrew Training Program
The goal of the Aircrew Training Program is to develop cohesive, combat-ready aviation units.
Army Aviation's future direction for training aircrews will help accomplish that goal.

Aircrew Training Manuals

Individual aircraft ATMs are being revised to include the new direction in the Commander's Guide. TC 1-214 is the first of the next generation of ATMs.

In the coordinating draft stage, scheduled for fielding in June or July 1992, are TC 1-209; TC 1-212, *ATM: Utility Helicopter, UH-60*; TC 1-216, *ATM: Cargo Helicopter, CH-47*; and TC 1-218, *ATM: Utility Airplane.*

Several months after these TCs are fielded, TC 1-211, *ATM: Utility Helicopter, UH-1*; TC 1-213, *ATM: Attack Helicopter, AH-1*; *TC 1-215, ATM: Observation Helicopter, OH-58A/C;* 1-217, *ATM: Surveillance Airplane, OV-1*; and TC 1-XXX, *ATM: Transport Airplane*, will be fielded. The development of crew coordination tasks, starting with TC 1-214, will be put in the other manuals.

The manuals are rewritten to delete information in the Commander's Guide, so only one source, the Commander's Guide itself, will give general information. We can thus avoid having manuals published at different times with conflicting guidances.

The focal point of the ATMs will be chapter 6, Individual and Crew Tasks. The new focus describes crewmember duties to perform the crew's task success-

REVISED ARMY AVIATION AIRCREW TRAINING MANUALS

TC 1-209, *ATM: Observation Helicopter, OH-58D*

TC 1-210, *Aircrew Training Program: Commander's Guide to Individual and Crew Training*

TC 1-211, *ATM: Utility Helicopter, UH-1*

TC 1-212, *ATM: Utility Helicopter, UH-60*

TC 1-213, *ATM: Attack Helicopter, AH-1*

TC 1-214, *ATM: Helicopter, AH-64*

TC 1-216, *ATM: Cargo Helicopter, CH-47*

TC 1-217, *ATM: Surveillance Airplane, OV-1*

TC 1-218, *ATM: Utility Airplane*

TC 1-XXX, *ATM: Transport Airplane*

Illustration by Paul Frehs

fully. The new generation of ATMs will reflect that aircrews fly aircraft and each crewmember has specific responsibilities to ensure safe and successful mission completion.

Chapter 7, Maintenance Test Pilot Tasks, will also be added to each ATM. When the last ATM is revised, FM 1-544, *Standardized Maintenance Test Flight Procedures*, will be superseded.

Tomorrow's Challenge

The challenge to aviation unit commanders is to implement the revised ATP as smoothly and efficiently as possible. Changes in attitude, training, and equipment to meet the needs of aircrews and their missions will enhance unit readiness. Training crewmembers to perform their duties as an integral part of an aircrew will increase aviation operational capabilities.

Now commanders can tailor their training program to focus on mission proficiency. They can focus on the mission for several reasons: specific guidance for each crew to work together as a team, not individuals working separately, is being developed for each ATM; and the shift toward the evaluation of crew performance complements individual performance.

The U.S. Army aviator is one of the best trained aviators in the world. Once the new program tools are fielded, aviation unit commanders should be able to make crew training as successful as individual training. The challenge has been made—the rest is up to you.

Aircrew Training Program

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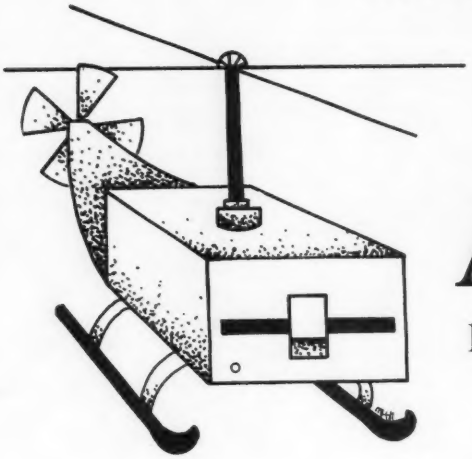

illustration by Maureen Ryan

ASET II

Programmed for All Aircraft

ASET II is an integral part of the aircraft survivability equipment (ASE) training program. The ASE program includes net, schoolhouse, and ASET II, III, and IV training, as well as training for the future ASE-electronic warfare officer course.

Army Aviation's success and survivability on the next battlefield depends on the aviator's ability to **identify** the threat; **know** the capabilities and limitations of the threat; and effectively **employ** aircraft survivability equipment (ASE). The aviator receives comprehensive threat and countermeasure training to perform these functions.

The Army has set a high priority on the requirement for both initial and sustainment training on ASE, threat, and tactics. The project manager for ASE (PM-ASE), St. Louis, MO, coordinating with the U.S. Army Aviation Center, Fort Rucker, AL, initiated a training device program to meet this need.

This program consists of an interim desk-top device (Aircraft Survivability Equipment Trainer-ASET I); a follow-on desk-top device (ASET II); an in-flight radar warning device (ASET III); and a threat emitter system (ASET IV).

With the fielding of ASET II, ASE training with this equipment is a mandatory annual requirement in the new Training Circular 1-210, *Aircrew Training Program: Commander's Guide to Individual and Crew Training*.

The ASET I provided immediate, individual training on ASE, threat recognition, and tactics. This device was used as a test for the follow-on ASET II program. ASET I, fielded in 1985, used the Microfix computer system for its hardware system.

The SECRET/NOFORN (not releasable to foreign nationals) courseware was used to teach threat, tactics, ASE operations, and countermeasures for AH-1 Cobra and OH-58A/C Kiowa aircraft. This training program and the limited hardware achieved maximum use only when emphasized by aviation unit commanders.

The ASET II training device uses the Electronic Information Delivery System hardware and Department of Army standard interactive courseware. The highly active SECRET/NOFORN courseware incorporates visuals produced by computer-generated imagery and is modularly computer-image generated (MODDIG). ASET II courseware teaches threat, ASE operations and

employment, tactics, infrared and radar principles, and countermeasures.

The scope of ASET II is expanded to include all aircraft: scout, attack, utility, and cargo, as well as special mission.

ASET II courseware, currently being fielded to active and reserve components, is designed into three modes—tutorial, game, and management. The tutorial mode presents lessons on threat, ASE, and tactics. The aviator learns capabilities and employment of ASE, characteristics and limitations of threats, and countermeasures.

To progress to the game mode, the aviator must score 90 percent on lesson tests. The aviation commander can use the tutorial mode for threat and ASE initial and refresher training.

The tutorial mode also places the aviator in either prompted or unprompted minibattle scenarios. The prompted scenarios guide the aviator through the switchology (the art of turning switches on and off in proper sequence) of ASE and gives hints about threat capabilities and limitations, as well as the correct countermeasures. The unprompted scenarios, used as stepping stones to the game mode battle missions, contain no prompts.

The game mode places the aviator in an intensified combat mission simulation. The aviator must complete a series of highly interactive visual scenarios that develop, reinforce, and challenge decisionmaking skills. Since mission scenarios present either low-, mid-, or high-intensity conflicts, the aviator is confronted with different threats.

To add further realism to the game mode, different ASE is inoperable for sections of the mission. These variables determine a successful game mode:

- Selection of the correct/incorrect course of action.
- Response time in selecting the course of action.
- Number of events in the scenario.

These variables determine the aviator's coefficient of survivability (CS). The aviator needs a CS of 1.0 or less to successfully complete the game mode.

The ASET II management mode tracks each aviator's progress throughout the training program. The aviator can use a paper printout to determine strengths and weaknesses of individual and unit ASE knowledge. The aviation commander can use this information to design remedial ASE or threat training. ASET II challenge tests can serve as a pretest and posttest for evaluation of existing ASE training programs.

The PM-ASE has toll-free hotlines 0800-1600 central time, Monday-Friday, to answer questions about ASET II. The hotline numbers are 800-545-ASET; Panama, 800-111-0420; Germany, 0130-81-0439; and South Korea, 008-1-800-901-8289.

In fiscal year (FY) 1994, ASET II courseware is scheduled for update to include all new ASE and new threat information.

The ASET III will be an in-flight training device that transitions the aircrew from the individual desk-top trainer (ASET II) to the full-up, force-on-force trainer (ASET IV).

ASET III will be used to teach ASE switchology interpretation and employment during unit training. ASET III is in the research and development phase with worldwide fielding scheduled for FY 1994-1995.

ASET IV will be a tactical threat emitter training device used at the combat training centers for force-on-force training. This training device will train the aviators and aircrews how to use ASE in Army tactical aircraft including scout and attack aircraft. ASET IV will be a multiple integrated laser engagement system where aviators can practice realistic, force-on-force engagements.

A master control vehicle and video display will enable the aviation commander to debrief and critique the battle. ASET IV is scheduled for fielding in FY 1993.

The U.S. Army Aviation Center, Fort Rucker, AL, and PM-ASE are working diligently to improve training of currently fielded and future ASE. With the fielding of these four trainers, Army aviators will be better prepared to fight and survive on the modern battlefield.

For further information on ASE hardware or ASE training devices, contact the ASE project officer, DSN 558-4110/4023, or commercial (205) 255-4110/4023.

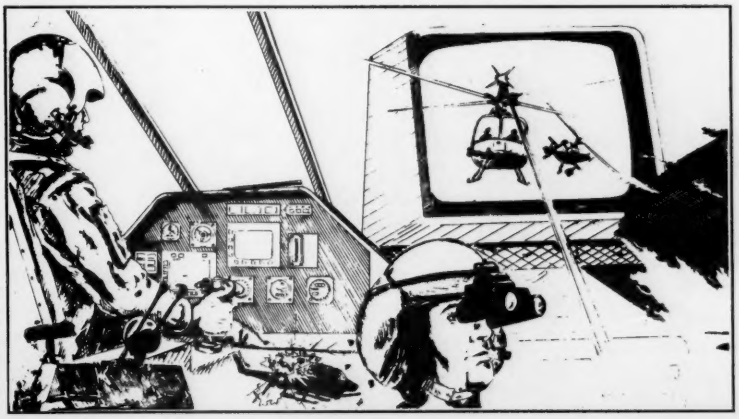

illustration by Judy Smith

Aircrew Training Program

Chief Warrant Officer (CW4)Richard M. O'Connell
DES CH-47 Chinook Standardization Pilot
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illustration by Paul Frehs

Commander's Task List

The new Training Circular (TC) 1-210, *Aircrew Training Program: Commander's Guide to Individual and Crew Training*, is the new commander's guide. Its publication will significantly change the present aircrew training program as it applies to units and individuals.

Publication of the new commander's guide, Training Circular (TC) 1-210, Aircrew Training Program: Commander's Guide to Individual and Crew Training, will result in significant changes to the present aircrew training program (ATP).

For example, the new guide will require commanders to focus on the mission essential task list (METL) to complete as much aircrew training as possible during unit collective training. The METL applies to the units.

The new guide will also reflect important changes for developing and using the Commander's Task List (CTL). The CTL applies to the individual. Part of the CTL is shown on the next page.

Determining the CTL

The CTL reflects the purpose, development, contents, and disposition of the unit. The CTL also provides a stand-alone document that informs aircrewmembers of aircrew training requirements according to the correct aircrew training manual (ATM).

Commanders use the CTL to specify training requirements. This ensures aircrewmembers gain and maintain the necessary proficiency to do the unit's wartime mission. Finally, once developed and signed by the commander, the requirements outlined on the task list become mandatory.

Determining the METL

In developing the ATP, the commander first must evaluate the unit's METL to determine collective train-

ing requirements. The METL lists equally essential tasks critical for to wartime mission of the unit derived from war plans and external directives. Once approved, the METL becomes the basis for developing training requirements necessary to do the unit's wartime mission.

Therefore, after reviewing the METL, the commander analyzes the unit's geographical area; probable peacetime employment roles; supported unit's mission; and past requirements. From this analysis, the commander develops supporting individual and crew task lists.

Developing Individual Task Lists

Developing individual task lists is the next step. After determining unit mission requirements, the commander reviews each duty position to decide how it can best support the unit's mission.

The commander analyzes each duty position based on its probable employment role and designates it as flight activity category (FAC) 1, FAC 2, or FAC 3. Duty positions designated FAC 1 require a higher level of proficiency; they also have greater semiannual flying-hour requirements than positions designated FAC 2. FAC 3 aviators maintain simulator minimums only.

Hence, at this stage of the task list development, the commander designates primary, and if proper, alternate, and additional aircraft.

Once the commander designates each duty position as FAC 1, FAC 2, or FAC 3, the process of developing a task list for each begins. Task lists include as a core all base tasks from the correct ATM. The commander then selects those special tasks from the ATM considered necessary to support the unit's METL.

After selecting the appropriate special tasks for training, the commander decides if additional tasks to support unit mission requirements should be developed. Thus, the commander develops the proper conditions and standards for any additional task selected for training.

At this point, the commander selects all tasks for training and determines the number of annual task iterations. The Commander's Guide intends for the commander to designate task iterations based on individual aircrew proficiency. As a minimum, the commander requires the annual completion of one iteration of tasks designated for training.

Subsequently, the commander identifies special or additional tasks felt critical for the unit's mission. He then designates them as mandatory for evaluation during the appropriate phases of flight.

Developing Night Flight Requirements

The commander next designates tasks for unaided and aided night flight that ensure individual aircrew proficiency and support the unit's mission requirements. When determining aided night flight requirements, the commander designates duty positions for night vision goggles (NVG) to comply with guidance in Department of Army (DA) Message 281309Z Aug 91, subject: Night Vision Goggle Training Message 91-2.

This message specifies the DA requirements for NVD-designated positions by type of unit. In addition, the message designates the approval authority for variations from the DA minimum requirements as the first aviation 0-6 in the chain of command.

Developing NBC Training and Evaluation Requirements

Finally, the commander specifies nuclear, biological, chemical (NBC) training and evaluation requirements. All FAC 1 positions and FAC 2 positions selected by the commander require training in the tasks outlined in chapter 5 of the correct ATM and those additional tasks selected by the commander.

■ Evaluate the unit's METL and determine total training requirements.
■ Evaluate each TOE or TDA duty position and determine its relationship to the unit's mission.
■ Designate each duty position as FAC 1, FAC 2, or FAC 3. Assign primary and alternate or additional aircraft, and determine crewmember and aircrew training requirements.
■ Develop a task list for each position:
-Select applicable tasks from the ATM and establish iteration requirements.
-Include any tasks not listed in the ATM and specify tasks conditions, standards, and iteration requirements.
-Specify the following:
(1) NBC training requirements.
(2) Training requirements for aided and unaided night flight.
(3) Flying-hour and simulation-device requirements for each crewmember.
(4) Additional tasks to be evaluated.
■ Publish a task list for each position and incorporate tasks into the unit's training program.
■ Evaluate training and modify task list as required.

Flight activity category (FAC) designation and task list development

The new TC 1-210 has significantly changed the present aircrew training program.

The new Commander's Guide requires commanders develop a suitable annual NBC evaluation program for aircrewmembers. Evaluations may be oral, written, or flight and need to be administered sometime during the aircrewmember's training year. Documentation of the annual NBC evaluation remains in the miscellaneous section on the right side of the individual aircrew training folder (IATF).

Developing Flight-Hour and Simulation Requirements

In addition, the commander also specifies annual flying-hour and flight-simulator requirements. The Commander's Guide, or the correct ATM, contains guidance for minimum flying-hour requirements. Minimum flight simulator requirements are found in AR 95-3 and appropriate major Army command (MACOM) supplements. However, commanders who operate aircraft not covered by an ATM will develop a suitable ATP for assigned aircrewmembers.

When developing unique ATPs for their unit, commanders should follow the general guidance provided in the Commander's Guide. The correct MACOM or chief, National Guard Bureau, must approve locally developed training programs. Forward a copy to the Directorate of Evaluation and Standardization, U.S. Army Aviation Center, Fort Rucker, AL.

Developing Crew Task Lists

Crew task lists must also be developed. Crew tasks are elements of the battle and team tasks found in the proper Mission Training Plan. The crew training tasks lists are developed only for those tasks involving flight or the planning and preparation for flight.

Crew tasks are ATM tasks that make training and evaluation of aircrews easier. Crew tasks generally require intensified coordination by the entire crew. The new TC 1-210 has examples of crew tasks for different aircraft.

Once the commander has established crew tasks, he will assign iteration requirements. Task iterations will be credited to a battle-rostered crew. An individual crewmember will not receive credit for accomplishing a crew task unless the task is completed with the battle-rostered crew.

Developing and Changing the CTL

At this point, the commander develops and publishes a CTL for each duty position within the unit. The CTL includes individual and crew task list requirements. The Commander's Guide specifies the minimum contents of the CTL. When publishing a CTL, any format applies if it clearly specifies all aircrewmember requirements.

Thus, changes in CTL format specified by the new Commander's Guide include major requirements: FAC level and date of FAC level designation; the aircrewmember's readiness level; notation of the paragraph, line number, and position title for the table of organization and equipment or table of distribution and allowances duty position. "None" is entered on the task list if the commander determines requirements do not apply.

The new Commander's Guide contains an example of a CTL for an active duty unit with instructions for completion. The sample CTL does not address all ATP needs, but it does contain the requirements specified in the revised Commander's Guide. Once completed and signed by the commander, the task list is ready to use.

Unit commanders can change task lists based on changes to the unit's mission or METL. Unit commanders may not change a task list to accommodate a crewmember who fails to complete ATP requirements.

Commanders periodically must revise or change a task list because of changing mission requirements. When this occurs, the new Commander's Guide requires retention of the previous task list in the IATF until the training year closeout is complete.

Summary

Changes reflected in the new TC 1-210 represent a significant shift in training emphasis. The new Commander's Guide requires commanders complete as much aircrew training as possible during unit collective training. The focus of this collective training is the unit METL. The material contained in the new TC 1-210, with FM 25-101, provides the necessary guidance to effectively develop and implement an ATP.

Aircrew Training Program

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illustration by Paul Fretts

Maintenance Test Pilot Standardization

This article discusses the maintenance test pilot standardization program and clarifies some issues that confuse commanders, standardization personnel, and maintenance test pilots. Because the program saves lives and enhances warfighting, it must continue as an integral part of the commander's aircrew training program.

MAINTENANCE TEST PILOT (MP) standardization in the United States Army has progressed significantly since the first guidelines were published in then Field Manual (FM) 55-44 in 1981. The original test pilot standardization efforts paralleled the existing pilot standardization program. Standardization philosophy hasn't changed significantly over the intervening years.

Maintenance test pilot standardization is not a separate program; it is an integral part of the commander's aircrew training program (ATP). The commander must develop a standardization program that includes all elements of the unit's aviation mission.

The requirement to train and evaluate test pilots is simply one critical element included in the commander's standardization program. The commander has experts available to help develop the ATP. These individuals include standardization instructor pilots, instructor pilots, aviation safety officers, maintenance test flight evaluators (MEs), and MPs. Standardization elements at all command levels must include a representative from the MP community. At the company level, this person may be an MP if an ME is not designated.

MEs from the Maintenance Test Flight Standardization Division, Directorate of Evaluation and Standardization (DOES), U.S. Army Aviation Logistics School (USAALS), Fort Eustis, VA, have found questions in the

Maintenance Test Pilot Standardization

field about ME/MP standardization. The following discussion addresses these questions.

Readiness Level (RL) Progression

Aviators assigned to MP positions must successfully complete an MP evaluation before progressing to RL1. RL progression for the MP is identical to RL progression for all pilots. RL3 training is essentially refresher training in all base tasks. RL2 is training in mission tasks as designated by the commander.

Maintenance test flight tasks listed in FM 1-544, *Standardized Maintenance Test Flight Procedures*, or the correct aircrew training manual (ATM) are the minimum mission tasks for the MP. MPs must receive training and evaluation in these tasks before progressing to RL1.

Many commanders want to progress newly assigned MPs to RL1 before the MPs complete training and evaluation. This is normally the case with recent graduates of the maintenance manager/maintenance test pilot course (MM/MTPC) who do not possess a high degree of aviation experience when assigned to the unit.

The theory is to let the aviator gain "experience" through participation in the unit's normal tactical or administrative mission. By not following set RL progression procedures for MPs, the unit actually hampers its ability to perform the maintenance mission for two reasons—

■ First and foremost, the unit loses the services of the school-trained MP. The MP quickly forgets the skills and knowledge gained at the MM/MTPC if not used. The recent graduate of MM/MTPC may not be required to continue practicing MP maneuvers and may not be involved in MP system training. If so, the ability to retain the valuable formal training quickly erodes.

■ Secondly, additional training requirements are a burden on the unit once the decision is made to bring the new test pilot back up to the standards specified in FM 1-544 or the correct ATM. Successful evaluation of test pilot mission tasks does not require the commander to place the aviator on MP orders.

MP orders are a command decision, much like pilot-in-command (PC) orders. Remember, a newly assigned aviator must demonstrate proficiency in all base and mission tasks for progression to RL1. This does not imply the commander must release this aviator as a PC.

The inexperienced maintenance officer should progress to RL1 and gain experience during continuation training by practicing MP mission tasks.

Mission Tasks

Aircraft specific chapters of FM 1-544 or the appropriate ATM is selected as mission or additional tasks for training and evaluation. Training Circular 1-210, *A Commander's Guide, Aircrew Training Program* (31 October 1986), points this out for aviators assigned to aviation maintenance officer positions. The commander must include these tasks in the MP's individual aircrew training folder (IATF) in the mission task list.

Having a separate maintenance test flight task list for MPs using the Department of Army (DA) Form 5051-R (Maintenance Test Flight Training Record) is neither required nor desired. DA Form 5051-R is designed as a tracking sheet for the convenience of tracking applicable tasks.

Commanders must ensure an aviator includes these mission tasks in the IATF after progressing to RL1, even if the aviator is not on MP orders. Future MPs must continue practicing test flight skills until the command decides to place the aviator on MP orders.

Iteration Requirements

FM 1-544 or the proper ATM requires that MPs complete a minimum of four iterations of all maintenance test flight mission tasks annually. The number of iterations can, and if necessary should, be adjusted upward, depending on the experience level of the individual aviator.

Complex tasks performed infrequently during maintenance test flights should be considered for increased iterations. Examples include the turbine engine analysis check in UH-1 Huey and AH-1 Cobra aircraft and the engine performance check in the OH-58 Kiowa aircraft. The key is the commander must evaluate the capability of MPs and individually tailor the iteration requirements.

Pilot-In-Command Requirements

During maintenance test flights, the MP is the PC. The intent of Army Regulation 95-1, paragraphs 4-5 and 4-6, is when a current, qualified, and properly briefed MP conducts a maintenance test flight, the MP is the mission pilot-in-command(PC).

Illustration by Paul Fretts

Commanders should assess the PC requirements according to unit standing operating procedures (SOPs). This ensures unnecessary PC selection requirements do not restrict qualified MPs from performing unit maintenance missions.

The PC requirements should be tailored to the individual's specific duty position. For example, if the MP's duties require cross-country flight, the IATF and PC selection requirements should be tailored to enable the MP to accomplish this task.

Unit SOPs often do not consider the maintenance mission. Many times, commanders require MPs to be qualified in all aspects of the unit's mission before selection as PCs. This prevents the MP from performing the unit's maintenance mission while undergoing training in areas of the unit mission not essential to the maintenance mission.

Designation of Maintenance Test Flight Evaluators

Beginning 1 October 1990, when the new FM 1-544 dated 4 September 1990 was released, questions have been asked about who may be designated as an ME. If an individual was functioning as an ME before 1 October 1990, he may continue to be designated by the commander as an ME.

After 1 October 1990, if the commander desires to designate an MP as an ME, and the individual has never served as an ME, the ME candidate must be evaluated by a representative of DOES or a DOES designee. Procedures for the designation of MEs are outlined in FM 1-544, paragraph 2-2d.

Subsequent Aircraft MP Training

FM 1-544 specifies procedures for qualifying MPs in subsequent aircraft as of 1 October 1990. If the aviator attended a formal MP qualification course of instruction in the UH-1, AH-1, or OH-58A/C, he may be cross-trained in either of the other aircraft and qualified as an MP. This is after he completes an evaluation given by a DOES ME or a DOES designee.

Sometimes qualification is sought in other aircraft. Then the individual must attend the formal course of instruction at USAALS or complete an equivalency evaluation conducted by a DOES ME. MPs qualified under subsequent aircraft training are considered graduates of the specific track of the MM/MTPC.

Throughout this article, reference has been made to FM 1-544 or the correct ATM. DOES is including all maintenance test flight mission tasks and qualification/training requirements in the individual aircraft ATMs. Work has been completed on the AH-64 Apache, UH-60 Black Hawk, CH-47D Chinook, and OH-58D ATMs.

When the new ATMs are published for these aircraft, FM 1-544 will cease as a reference. FM 1-544 will no longer exist when all aircraft ATMs have been rewritten to include maintenance test flight mission tasks.

In summary, the commander has individuals to help develop the unit standardization program. Among these are the MEs who must be included in the standardization program at all command levels. The commander needs to evaluate the unit's maintenance mission and ME/MP proficiency in developing a comprehensive training program for the maintenance personnel. The Director of Evaluation and Standardization, USAALS, is happy to help units develop their ME/MP standardization programs.

Questions about the maintenance test flight standardization program should be forwarded to Assistant Commandant, USAALS, ATTN: ATSQ-LES-M, Fort Eustis, VA 23604-5429, phone DSN 927-3266/4164 or FAX DSN 927-4164.

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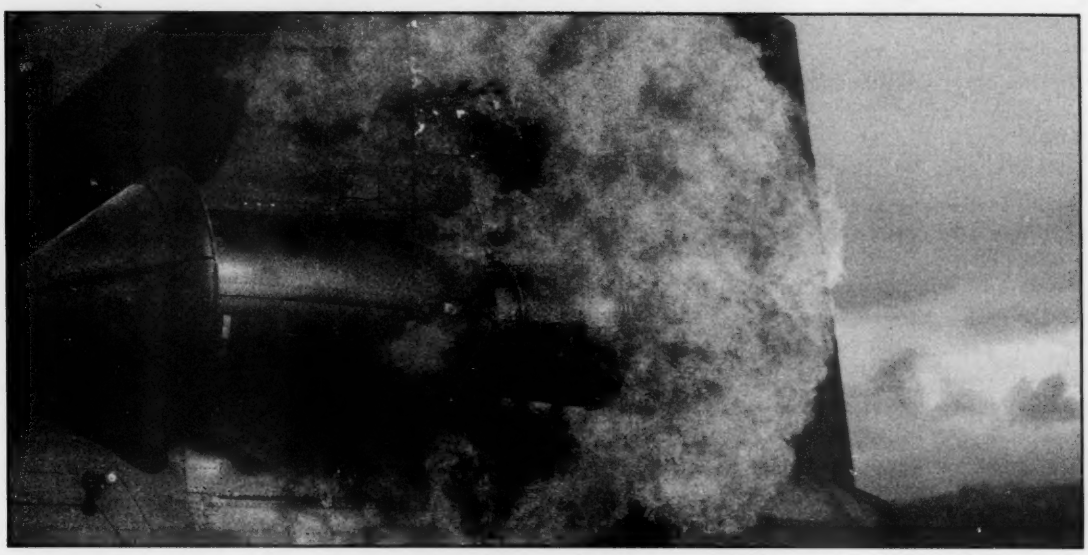
The Nonrated Crewmember Standardization and Training Program for Utility and Cargo Helicopters

What do training, accidents, and money have in common? A study 7 years ago found that improved nonrated crewmember training could prevent accidents and save money. This article shows how by explaining new information in TCs 1-210, 1-211, 1-212, and 1-216; ARs 95-1, 95-3, and 600-106; and FM 1-300.

SEVEN YEARS ago, a research was conducted from Fort Rucker, AL, to determine the necessity of a formal nonrated crewmember training and standardization. The study revealed from units worldwide that many accidents could be prevented and a significant amount of money could be saved if the nonrated crewmember had better training.

By now, most people in the aviation community know about some type of nonrated crewmember training and standardization program.

Aviation commanders know Training Circular (TC) 1-210, *Aircrew Training Program: Commander's Guide*, 31 October 1986, states the aircrew training program (ATP) does apply to nonrated crewmembers. Unfortunately, the amount of Department of the Army (DA) published guidance that a commander receives about



Engine malfunctions, such as this hot start on a CH-47 Chinook, prove that even a simple task such as knowing where to stand during engine start must be part of crew training.

developing and maintaining a nonrated crewmember training program begins and ends with this statement in TC-210.

Many changes are being made to the publications to give the commander better guidelines for developing and maintaining this program. In this article, the author will clarify the "gray areas" and update the reader about the changes and applicable publications.

The following publications regulate and give guidelines for developing and maintaining a nonrated crewmember training program. The asterisk (*) denotes a change being submitted but not yet approved for that publication.

Army Regulation 95-1

*AR 95-1, Aviation Flight Regulations, *paragraph 2-6, Logging Flying Time*. The codes FI (nonrated crewmember instructor) and SI (nonrated crewmember standardization instructor) are used when a qualified nonrated crewmember instructor conducts in-flight training or evaluations. This will allow an instructor to log time for pay on an aircraft normally restricted to a certain number of crewmembers according to AR 600-106, *Flying Status for Nonrated Army Aviation Personnel.* The time accumulated under these codes will be recorded on DA Form 759 which becomes a permanent part of the crewmember's flight records. This will give the commander a document to use to determine the qualifications of a nonrated crewmember when selecting one to fill a vacant instructor slot.

**Section II, chapter 4, Flight Crewmembers*. Paragraphs defining the nonrated crewmember (flight engineer or crewchief), FI, and SI will be added to this section. These definitions will spell out prerequisites and qualification requirements for the different types of crewmembers.

**Paragraph 4-5, Flight Crews*. The reference to flight crewmembers means all flight crewmembers.

**Paragraph 4-18, Hands-on Performance Test*. This paragraph will be changed to include the nonrated crewmembers hands-on performance test requirements.

Army Regulation 95-3

AR 95-3, Aviation: General Provisions, Training, Standardization, and Resource Management, paragraph 4-2, Aircrew Training Program. Subparagraph b states the ATP is mandatory for aviators and other crewmembers specified in the aircrew training manuals (ATMs). One of the most confusing things to deal with is conflicting statements in our publications.

TC 1-210 states the ATP applies to all crewmembers. AR 95-3 states the ATP applies only to those crewmembers specified in the ATM. The statement in the AR assumed the cargo and utility ATM supplements would be published for nonrated crewmembers.

Nonrated crewmember duties will be included in the ATMs. However, developing and publishing this information may take a while. The new TC 1-210, *Aircrew Training Program: Commander's Guide to Individual and Crew Training*, states commanders will develop their own ATMs for nonrated crewmembers. In this paragraph, DA civilian (DAC) aviators will be changed to DAC crewmembers.

**Paragraph 4-18, Failure to Pass Hands-on Performance Test.* This paragraph will be changed and will outline procedures for nonrated crewmember test failures.

All future ARs will use the words "nonrated crewmembers" or "crewmembers" instead of "nonaviators."

Army Regulation 600-106

AR 600-106 is undergoing a major revision. Paragraph numbers are not available. Before reading this AR, one needs to understand the different types of nonrated crewmembers. Aviators can find definitions for a crewmember and a noncrewmember on page 2, paragraph 4, of the current AR.

One change in this regulation has the greatest effect on training and standardization of the nonrated crewmember. This change is relaxing the constraints placed on the noncrewmember's ability to log flight time for pay.

Currently, a noncrewmember can only fly for pay if the duty performed aboard the aircraft cannot be performed by the assigned crewmember. The changed AR will allow noncrewmembers to perform normal crewmember duties in place of a crewmember who is absent because of temporary duty, leave, quarters, grounding, or other authorized reasons.

The noncrewmember who performs these duties must be military occupational speciality (MOS) qualified in the aircraft in which duties are performed (67T, 67N, or 67U). Also, that person must be integrated into the commander's ATP. This means the crewmember must be a qualified RL1 crewmember according to the applicable ATM.

The AR will also allow noncrewmembers to log flight time for pay while being trained to perform crewmember duties. If used properly, these noncrewmembers can be an asset to the commander.

Normally, there are four or more noncrewmember slots filled by the platoon sergeant and squad leaders in a maintenance platoon or section. If two of the slots were dedicated only to training new crewmembers, the time lag could be cut considerably. Time could be saved between losing a qualified crewmember out of the flight section and gaining a qualified crewmember from the maintenance section.

The primary trainer for these crewmembers has to be a qualified and designated nonrated crewmember instructor. For the flight time to count for pay, a training and evaluation grade slip must be completed according to the correct ATM.

Technical inspectors (TIs) normally have a difficult time receiving flight pay for the time they accrue. Because TIs are MOS qualified and normally have some crewmember experience, they may also log flight time for pay as outlined in the above paragraphs. Unfortunately, other soldiers on noncrewmember flight status, such as electricians and avionic technicians, will still have a hard time accruing flight time for pay, because these paragraphs do not apply to them.

Field Manual 1-300

Field Manual (FM) 1-300, *Flight Operations and Airfield Management*, deals with the crewmember's flight records. Currently, the only required recording in the cargo and utility nonrated crewmembers' flight records are two things: CE (the duty symbol they fly under) and the time they fly. The changed FM will include the new flying duty symbols FI and SI.

FM 1-300 will also require the flight records clerks to track the crewmember's daytime (condition symbol D) and night vision goggles (NVG) time (condition symbol NG) separately. This is necessary to keep up with currency requirements.

On the backside of DA Form 759 is part IV, the Remarks section. This section of the form is the best place to record all the crewmember's qualifications. The DA Form 759 is a permanent record that stays in the flight records as long as the crewmember is in the Army.

When a soldier has permanent change of station to a new unit, the gaining unit commander should be able to look at the flight records and individual training records of that soldier and determine that soldier's crewmember qualifications.

Use simple statements in this section, such as "individual completed initial NVG qualification on 2/8/90," or "initial CH-47 Chinook crewmember qualification completed on 3/12/89."

Commanders sign certifying this information is correct, so make sure all the proper grade slips, diplomas, and other documents are presented to operations personnel before putting these qualifications on DA Form 759.

Training Circular 1-210

Training and standardization for the nonrated crewmember is becoming a way of life. The more in-depth inclusion of the nonrated crewmember into TC 1-210 makes the nonrated part of the ATP easier to develop and maintain.

Many changes to the new TC 1-210 affect the nonrated crewmember program. To explain all these changes, this article would have to be as large as the TC itself. It's easier to say the nonrated crewmember requirements remain the same. However, the new TC defines them better and in more detail.

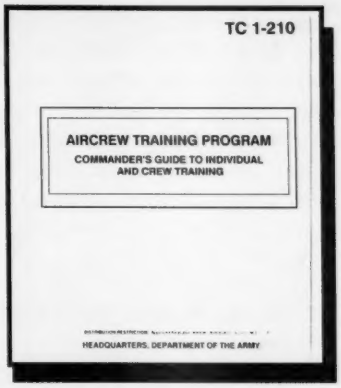
Rated and nonrated crewmembers have not seen these major changes:

Crew coordination. One of the most driving factors to involve nonrated crewmembers in a formal standardization and training program is crew coordination. TC 1-210 contains a section dedicated to this subject and nonrated crewmembers need to read it carefully. They must understand crew coordination is not just something that happens in the cockpit, but in the entire aircraft.

Battle rostering and crew training. Battle-rostered crews are crewmembers (rated and nonrated) who have been assigned to fly and train together as a crew. These crews perform specific crew tasks contained in the ATM. They progress through crew readiness levels (CRLs) similar to individual readiness levels .

Crews do not need to fly together all the time. They have to demonstrate proficiency in the designated task to progress to CRL1. They have to fly enough time together during the training program year to perform the number of tasks iterations required by the commander.

NVG. NVG is new to TC 1-210, but not to crewmembers. This change, an entire chapter to the TC, consolidates all NVG training messages we have seen.


TC 1-210
AIRCREW TRAINING PROGRAM
COMMANDER'S GUIDE TO INDIVIDUAL AND CREW TRAINING
HEADQUARTERS, DEPARTMENT OF THE ARMY

Commanders use TC 1-210 and applicable ATMs as guidelines to develop their units' aircrew training programs. Crew coordination, battle rostering, and night vision goggles are major changes in the new TC 1-210 that affect the nonrated crewmember program.

Crew coordination and battle rostering are the driving factors in continuation training for both rated and nonrated crewmembers.

Training Circulars 1-211, 212, and 216

A major revision of these aircrew training manuals began in January 1992. The primary purpose of this revision is to rewrite the tasks in the crew coordinated format. The tasks will include the nonrated crewmembers in these revised utility and cargo ATMs. In the description of these tasks, the nonrated crewmember is the CE; the pilot on the controls, P*; and the pilot not on the controls is P. The task description is written in sequential order, so a crewmember reading the task knows exactly what to do and when to do it.

The following is the crewmember's task description from TC 1-216 for performing a before-landing check:

- Before initiating an approach for landing, the P* will call for or perform a before-landing check.
- The P will correctly use the checklist to make the appropriate checks and verify proper responses in correct sequence. He will verify any before-landing check performed by the P*.
- The CE will perform all checks when required by the P* or P and give correct response when the check is complete.

By rewriting the tasks in this format, they create crew tasks for battle-rostered crew training and they incorporate the nonrated crewmembers into the tasks, standards, and descriptions.

Individual tasks for nonrated crewmembers will also be included in the ATMs. The ATMs will include the nonrated crewmembers in all chapters, outlining and defining all the nonrated crewmembers' ATP requirements.

Personnel, Standardization, and Training

Officers. Commanders use TC 1-210 and the applicable ATMs as guidelines to develop their units' aircrew training programs. They approve the commander's task list and select qualified crewmembers to perform FI and SI duties. The commander delegates the management of the program to the standardization instructor pilot (SIP) and SI.

IPs and the SIP help the nonrated crewmembers develop their program. The SIP should directly supervise the SI in the day-to-day management of the nonrated crewmember program.

Platoon leaders should ensure the platoon sergeant has enough time allocated for academic and in-flight training. They should also ensure training missions are scheduled to allow quality pilot and nonrated crewmember training is conducted simultaneously.

Trying to balance a nonrated crewmember's time among soldier training, aircraft maintenance, detail, duty, and crewmember training is a tough job. The platoon sergeant needs all the help he can get.

Noncommissioned Officers (NCOs). The first sergeant is responsible for making sure the unit has required personnel. He must know the unit needs and request the necessary schools and replacements for outgoing crewmembers. This individual should also know the training requirements for a nonrated crewmember and allow the platoon sergeant enough time to train personnel.

The platoon sergeant must know this program. This person is responsible for selecting and supervising nonrated crewmembers. He should contact daily the company SI and platoon FIs, informing them of what training crewmembers need; receiving updates on crewmembers' progress; and helping to train instructors.

If the platoon sergeant is on flight status, he should fly with crewmembers and instructors frequently to ensure they conduct training properly. The platoon sergeant cannot perform duties as an FI or SI unless he has qualified for the duty and is designated as an FI or SI by the commander.

The SI should work in the company or battalion standards section under the supervision of the SIP. The SI ensures the program is managed according to the TC 1-210, ATM, and applicable ARs. He maintains the Individual Aircrew Training Records and schedules all academic and flight training.

Although the SI does not directly supervise the platoon FIs, he works closely with them to ensure all training is done according to the ATM. He also trains and evaluates the FIs. The SI has no authorized slot for tables of organization and equipment (TOE) or tables of distribution and allowances. Therefore, the unit must find a slot to fill this position.

If the SI needs to be on full crewmember flight status, AR 600-106, paragraph 11, shows how to apply for additional flight slots.

The FI's primary duty is to train the nonrated crewmember. The FI also performs normal crewmember duties and is usually assigned an aircraft within a platoon. An ideal ratio is one FI for every eight crewmembers. The CH-47 TOE has two slots identified by additional skill identifier (ASI) N1 for each platoon.

The Nonrated Crewmember Night Vision Goggles Trainer (NCT) trains nonrated crewmembers according to NVG messages or the NVG chapter in TC 1-210. Any rated or nonrated crewmember can perform duties as an NCT after meeting the requirements stated in the NVG message or TC 1-210.

Today's complex missions and highly technological Army aircraft, such as the UH-60 Black Hawk, demand well-trained crewmembers.

The nonrated crewmember's primary duty is to perform in-flight duties and scheduled or unscheduled maintenance on the assigned aircraft. He is trained through RL progression like a pilot. This training is outlined in the ATM.

Any NCO who is an RL1 qualified nonrated crewmember may conduct training. However, an FI or SI must supervise the training and must also conduct nonrated crewmember evaluations.

The CH-47 crew consists of two nonrated crewmembers. Both crewmembers undergo the same RL progression training and evaluations. Once a crewmember is designated RL1, the commander may select that person as flight engineer.

The flight engineer is responsible for the helicopter, the crewchief, and any other personnel performing helicopter maintenance. Commanders should base their selections on experience, proficiency, rank, and the recommendations of the platoon sergeant and SI.

Any soldier qualified in MOSs 67U, 67T, or 67N and who can pass a flight physical can be selected to perform noncrewmember duties as a flight engineer or crewchief on his specific aircraft. Selection of soldiers to perform these duties should be based on maintenance experience and proficiency, initiative, attitude, and conduct.

Schools and training. The Flight Engineer Instructor Course is the only formal school conducting training of nonrated crewmembers who do not fly the aircraft. This course is a combination of the Instructor Training Course, Aviator Qualification Course (ground school), Aircrew Training Program Management, and in-flight duties training. This course produces flight engineer instructors with an ASI of N1.

Currently, the U.S. Army Aviation Center, Fort Rucker, AL, and the U.S. Army Aviation Logistics School, Fort Eustis, VA, are developing an exportable training packet for training nonrated crewmembers.

Standardization. The Directorate of Evaluation and Standardization (DES) reviews and monitors the publications and overall standardization of this program. DES has two nonrated crewmember standardization instructor positions, one each for cargo and utility helicopters.

These NCOs review all publications and training programs that concern nonrated crewmembers. They make frequent trips to the field as part of the DES inspection teams. They also conduct evaluations of individual crewmembers and the unit's nonrated crewmember programs. Because the program is new, the main purpose of the evaluations is to assess how the program works and to offer assistance.

Aircrew Training Program

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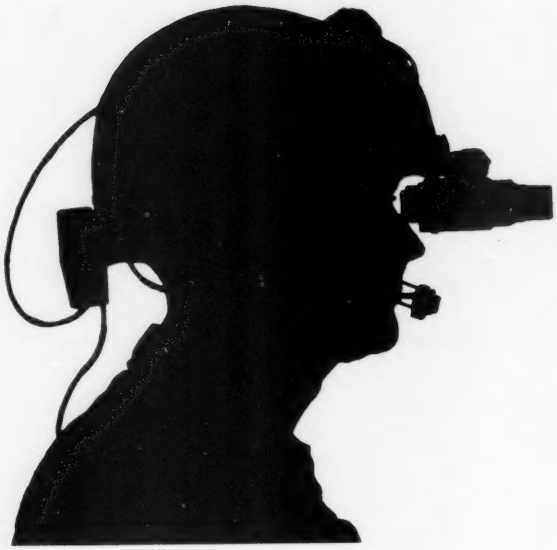


Night Vision Goggles Training Update

TC 1-210, chapter 4, is the single source for consolidating some 35 training and operations messages. This consolidation has saved time and money, as well as unnecessary paperwork. This article addresses some of the key areas and frequently asked questions about chapter 4.

Chapter 4 of the new Training Circular (TC) 1-210, *Aircrew Training Program: Commander's Guide to Individual and Crew Training*, is a "tuned-up" version of the Department of Army (DA) message 281309Z Aug 91, subject: Night Vision Goggle Training Message 91-2.

Let's begin with the designation of NVG positions. Commanders must designate tables of distribution and allowances/tables of organization and equipment (TDA/TOE) TOE positions to which aviators are assigned, based on unit mission essential tasks. AH-64 and fixed-wing slots are not used to determine minimum requirements. Aviators assigned to designated positions are expected to be the unit "night fighters." As such, their NVG readiness levels are reported, even though these "night fighters" may be designated RL1 for day purposes. Nonrated crewmembers, however, are not required to be managed this way. However, commanders should ensure they have enough of these properly trained personnel.

Units conducting NVG operations must have a standing operating procedure (SOP) addressing subject areas listed in TC 1-204, *Night Flight Techniques and Procedures*.

Directorate of Evaluation and Standardization and the Night Vision Device Branch, Aviation Training Brigade

(ATB), have written a checklist aviators may use to evaluate SOPs. ATB has that checklist and all applicable messages on a 5-inch floppy disc.

To request this information, users may write to Commander, ATB, ATTN: ATZQ-ATB-NS, Fort Rucker, AL, 36362-5218. An upcoming rewrite of TC 1-204 will outline a recommended unit SOP.

NVG Readiness Levels

Aviators are normally designated NVG readiness level (RL) 3 under three conditions: initial NVG qualification, additional aircraft qualification training, or refresher training.

Aviators must finish these training requirements at a crew position with access to the flight controls within 45 days. An aviator may be designated RL3 when NVG currency is lost due to a lack of proficiency demonstrated during a proficiency flight evaluation. In this case, the aviator must undergo some basic task retraining.

Aviators must use the exportable training package (ETP) for all initial NVG qualifications. Using the ETP for recurring academic training is a good idea.

Aviators completing NVG RL3 training are expected to progress immediately to NVG RL2 mission training with these exceptions: when finishing initial NVG qualification training to meet the DA requirement; and when completing AH-64 Apache NVG qualification and mission training is not required.

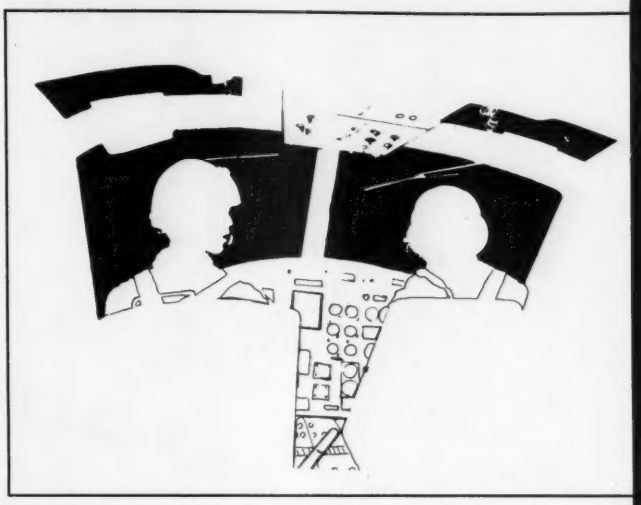
During RL1, continuation training, aviators assigned to designated positions must complete 9 hours of NVG time at night from a crew position with access to the flight controls during each semiannual period. This provision doesn't necessarily add flight time requirements for the aviator.

For example, if the aviator is required to accomplish 48 hours semiannually in the primary aircraft, the aviator must fly 9 of the 48 hours under NVG. Aviators who have access to a compatible visual simulator may apply up to 3 hours of simulator time toward the 9-hour requirement.

NVG pilots in command, regardless of TDA/TOE positions, must complete the 9-hour semiannual requirement.

All aviators required to maintain NVG currency must fly 1 hour every 45 days. If this time lapses, the aviator must take a proficiency flight evaluation and be placed in the proper readiness level after the evaluation.

This means if aviators undergo this proficiency flight evaluation demonstrate evaluated proficiency in the specified base and mission tasks, they may be placed back in RL1. If aviators lack proficiency in these tasks, they must be redirected into the correct RL status.



Introducing the NCT

A new trainer, the NVG nonrated crewmember trainer (NCT), has been added specifically for NVG training. The commander may select, train, evaluate, and designate on orders any crewmember for NCT duties.

The designation of NCT should be reserved for the nonrated crewmembers who train and evaluate other nonrated crewmembers. Ideally, the nonrated crewmembers execute the nonrated crewmembers' training program and standardization personnel should monitor it.

The guidance for the aerial observer or aerial fire support observer training, now in TC 1-215, will be in TC 1-209. Program managers should not confuse this training with nonrated crewmember training.

AH-64 copilot gunners are authorized to fly aviator night-vision imaging system from the front seat, according to the Interim Statement of Airworthiness Qualification. Those aviators qualified with NVG in another aircraft must receive additional aircraft NVG qualification in the AH-64.

Once aviators complete the additional aircraft qualification, they should be mission trained on any specific task the commander requires and then progressed to RL1 for NVG. The AH-64 NVG aviator then requires standard NVG currency flight time and an annual NVG evaluation.

Aircrew Training Program

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illustration by Paul Fretts

Training Scenarios

Tactical scenarios have been considered the most misunderstood and least-used tools to help commanders administer the ATP. Instead of being unwanted paperwork drills, tactical scenarios can serve as a valuable tool to help commanders administer ATPs. The purpose of this article, therefore, is to show commanders how they should develop scenarios to administer the best possible ATPs so aircrews can work as a team to successfully accomplish the mission.

TACTICAL SCENARIOS are perhaps the most misunderstood and least used tools commanders have to help administer the Aircrew Training Program (ATP). Developing scenarios is a mandatory requirement in the new Training Circular (TC) 1-210, *Aircrew Training Program: Commander's Guide to Individual and Crew Training*.

However, little guidance existed on how best to develop and implement a scenario-based ATP. To correct this shortcoming, TC 1-210 explains in detail how to develop scenarios and shows a complete example based on a five-paragraph operations order (OPORD).

The purpose of this article is to provide some insight into tactical scenarios.

The important question is, "How does one develop and implement tactical training scenarios to help commanders administer the ATP without the ATP becoming another 'paperwork drill' for the Directorate of Evaluation and Standardization?"

To help answer this question, we must look at some important considerations. For scenarios to have any meaningful value, they must—

- Support the unit's mission essential task list (METL).

■ Make administration of the ATP more efficient and meaningful.

■ Be "living documents" that truly reflect the commander's intent for the ATP.

■ Provide timely feedback for ATP direction.

Let's look at the considerations and see how to apply them in developing tactical training scenarios.

Let's consider the requirement to support the unit's METL. To completely discuss the development of the METL is beyond the scope of this article. However, a complete discussion of this process is in Field Manuals (FMs) 25-100 and 25-101.

For the purposes of this article, the METL is the focal point for all training conducted in any Army unit. The METL lists tasks essential to accomplishing the unit's tactical mission. What can serve better than the METL to begin developing tactical scenarios?

Let's suppose the following tasks are in the METL for an attack helicopter battalion—

■ Deploy

■ Conduct movement to contact

■ Conduct screening operations

■ Conduct deliberate and hasty attacks

■ Conduct sustainment operations

Now, let's write a five-paragraph OPORD for tactical missions for each of these tasks, such as a task to deploy or a task to screen. Using these as a guide, commanders, platoon leaders, instructor pilots, and all trainers in general should be able to write variations on each task.

For more flexibility, each scenario could have blank grid coordinates to be filled in by the mission briefer. Still another technique in some units is adding questions at the end of the scenario to further enhance the unit no-notice program.

Questions involve subjects such as tactical standing operating procedures (SOPs), threat identification and weapons ranges, and aircraft survivability equipment. The questions are endless. However, the bottom line is still the same: make the scenarios work for the aviator. Otherwise, they become just another paperwork drill.

Let's suppose we use these same five METL tasks as sections of a binder. The first section would be labeled "Deploy," the second, "Movement to Contact," and so on. Flight conditions would be subsections labeled Day; Night Unaided; Night Aided; and Nuclear, Biological, Chemical.

Thus for every METL task, each applicable flight condition, such as the ones above, has a scenario. For instance, in an AH-1 Cobra attack helicopter battalion, the section labeled "Deliberate and Hasty Attacks" might not have any scenarios under the Night Aided or Night Unaided section, but an AH-64 Apache battalion might have scenarios.

Instrument tasks for these units could be included at the end of each mission, executing a simulated vertical helicopter instrument recovery procedure. This is precisely the condition under which an AH-1 or OH-58 Kiowa can be expected to perform instrument tasks.

We now have a scenario book to relate directly to the unit's METL. Aviators can add scenarios to each section. Having many different scenarios in each section adds flexibility to the program and helps keep scenarios from becoming "canned."

Each scenario should list the ATM tasks it supports. Care must be taken to make sure the scenario does not dictate unrealistic requirements. For instance, a scenario could list tasks mandatory for completion to receive credit for the scenario; other tasks, such as performing multiship operations, are optional and may be completed as the situation dictates.

Commanders can use scenarios to develop and administer mission training for aviators new to the unit; tactical team training and crew drills; and platoon, company, and battalion battle drills. The "Deliberate Attack-Cross Flot" is a good example of a detailed scenario.

As "living documents," the scenarios should be constantly reviewed and updated to reflect changes to unit SOPs or METLs and perhaps refined to more usable documents. OPORDs issued for unit field training exercises can be used to update the scenario book. Some benefits of using scenarios in an organized book include—

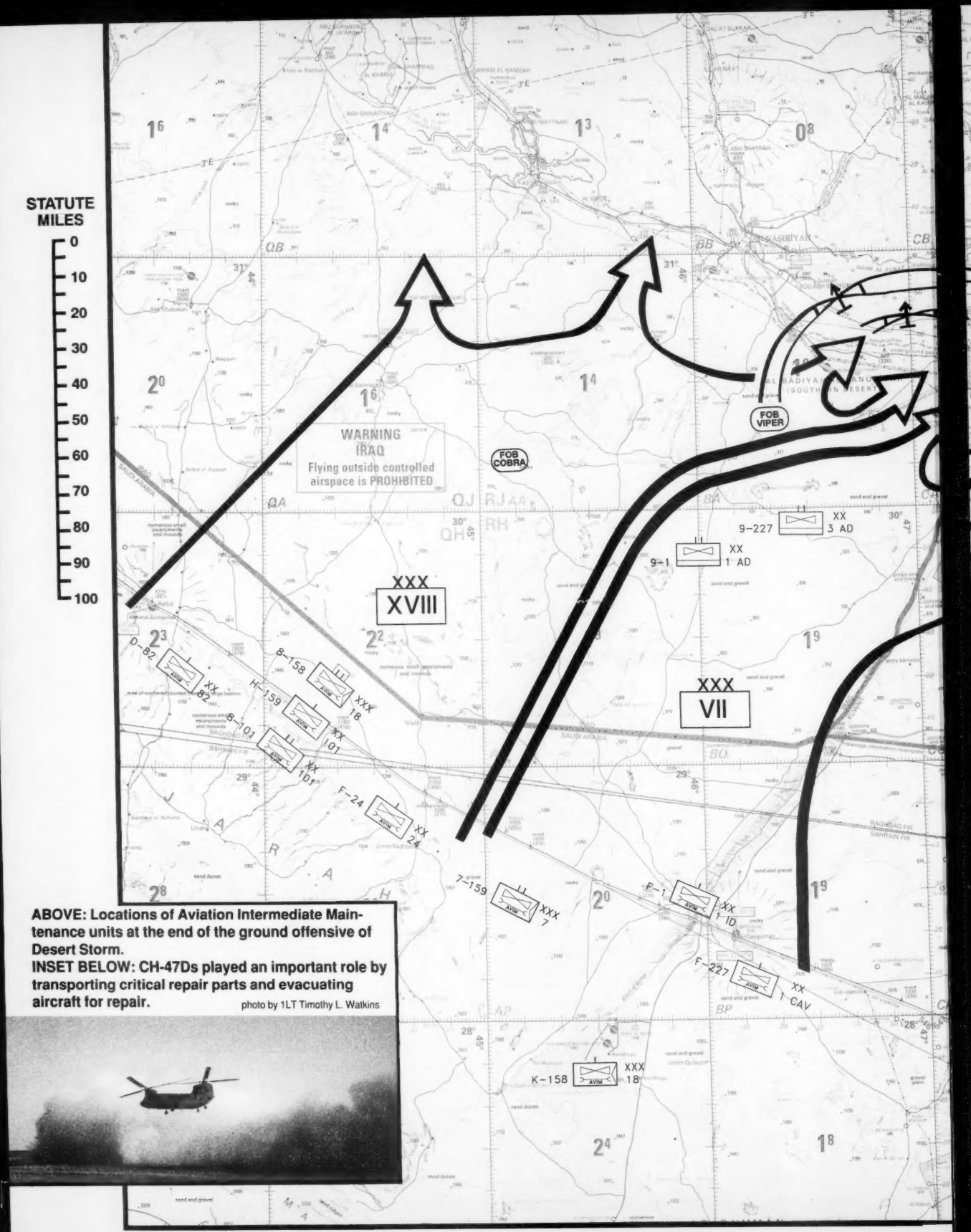
■ Crewmembers are made more aware of the unit's METL.

■ Tactical training in garrison is conducted much the same as it would be in a tactical environment.

■ Crewmembers receive constant exposure to unit OPORDs and tactical SOPs.

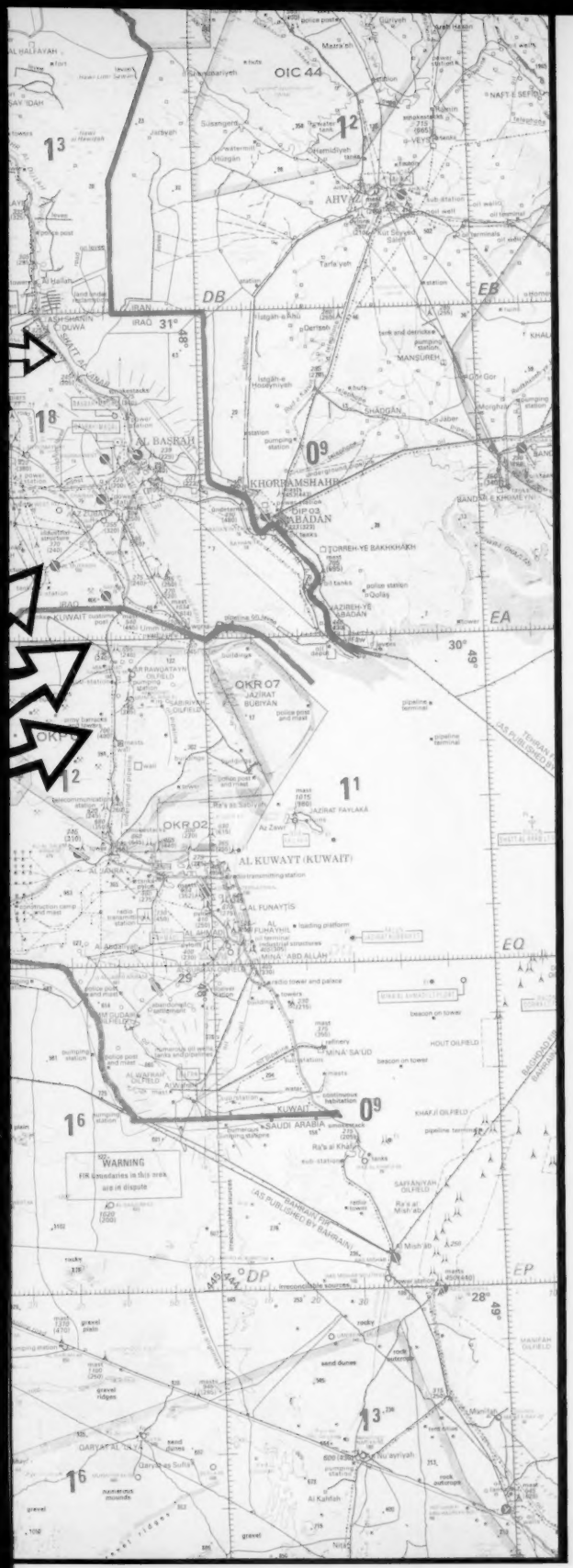
■ The commanders intent for administering the ATP is clearly established for all crewmembers.

An organized scenario book is only one of many ways to develop and implement a tactical scenario training system. The bottom line is the same: if the system does not enhance unit training, then the tactical scenario serves no useful purpose. With a little thought and unit's trainer participation, every unit can develop a scenario system that best suits its needs.



ABOVE: Locations of Aviation Intermediate Maintenance units at the end of the ground offensive of Desert Storm.
INSET BELOW: CH-47Ds played an important role by transporting critical repair parts and evacuating aircraft for repair.

photo by 1LT Timothy L. Watkins



Aviation Logistics Mobility

LESSONS LEARNED

First Lieutenant Gregory K. James

1LT James served as Headquarters Troop Executive Officer, 2d Squadron, 17th Cavalry, 101st Airborne Division (Air Assault), during Operation Desert Storm.

ARMY AVIATION has just completed one of the best tests of its doctrine and equipment in the last 20 years. To ensure our readiness in the next conflict, we must learn the lessons of Operations Desert Shield/Desert Storm (ODS). One of the most important lessons for Army Aviation is that its logistics require increased mobility if they are to support the aviation brigade on a sustained offensive.

The Army's goals for the future include increased mobility to create a rapidly deployable deterrent force. Our current aviation logistics mobility does not support that goal. During ODS, aviation unit maintenance (AVUM) had too few trucks and trailers to deploy all of their parts, tools, and personnel with the air maneuver elements. The aviation intermediate maintenance (AVIM) companies and battalions had too few organic vehicles and bulky equipment that was hard to transport. Too few test sets were available to support their maintenance support teams (MSTs).

How Mobile Should Aviation Logistics Be?

Army Aviation's leaders and future doctrine both provide guidance about how mobile our logistics should be. In a recent address,[1] Aviation Branch

photo by 1SG Jerry J. Jarrel

photo by 1LT Timothy L. Watkins

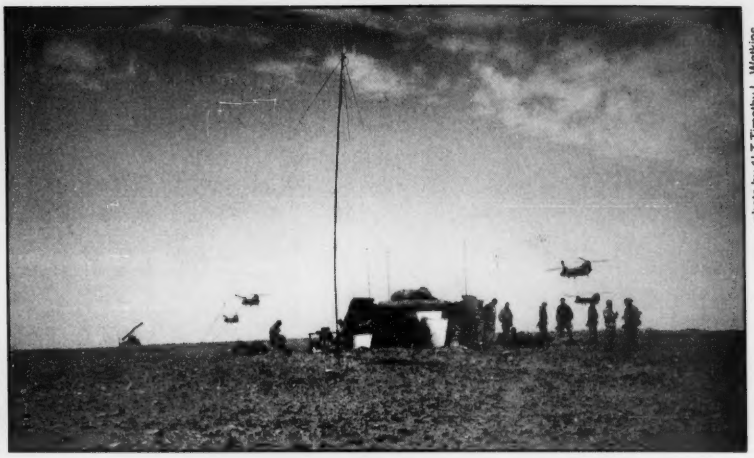


photo by 1LT Timothy L. Watkins

TOP LEFT: 101st ABN DIV staging area on G-Day (beginning of ground offensive). Division ground vehicles prepare to follow forces air assaulted into Forward Operating Base (FOB) Cobra. BOTTOM LEFT: Troops loading a UH-60 for assault deeper into Iraq. RIGHT: On the first day of the ground war, air manuever elements moved over 90 miles forward. AVUMS had to leave their more-cumbersome equipment behind in Saudi Arabia.

Chief, Major General Dave Robinson, stated the focus of future force structuring should be to create a credible deterrent force deployable anywhere in the world within 48 to 72 hours. This force, he said, should be able to conduct sustained combat upon arrival. The Army Logistics Long Range Plan (LOGC 1986) reinforces this requirement for mobility by stating that "Combat service support units must be compatible with and equally mobile as the units they support."

The preceding guidance requires both the AVUM and AVIM be able to strategically deploy anywhere in the world in 48 to 72 hours. It also requires the AVUM to be prepared to begin supporting its aviation unit immediately upon arrival in the theater of operations (TO). The AVIM must be operational within 24 hours and have contact teams operational immediately on arrival in the TO.

For our combat service support (CSS) to be as mobile as its supported units, the AVUM companies must be able to deploy—both strategically and tactically—with their battalions and take all necessary equipment with them. They must be able to quickly employ their personnel and equipment, and move again on short notice. This means the AVUM not only must be able to transport all of its parts, equipment, and personnel in one load, but also conduct maintenance right out of its vehicles.

To support their aviation brigades, divisional AVIM companies should be able to move as often as every 3 to 5 days. They should complete that move in 1 day. They must be able to send MSTs forward with the proper tools for battlefield repairs. Finally, AVIMs must be close enough to the aviation battalions to conduct slingload evacuations of aircraft that cannot be repaired forward. To meet the above requirements, both AVUM and AVIM should be 100-percent mobile.

Current AVUM Mobility

With this objective in mind, let's examine our current mobility as witnessed during the war in the Gulf. Afteraction reviews (AARs) from the war[2] reveal that the AVUM companies did not have enough tactical mobility to move on the battlefield with their units. They had to leave behind much of their heavy equipment such as forklifts, engine test stands, and test sets to maintain the mobility required. Many AVUM ground vehicles were old and unreliable. Soldiers spent valuable time working on vehicles instead of aircraft. Many technical supply sections found that their table(s) of organization and equipment (TOEs)

photo by 1LT Timothy L. Watkins

FOB Viper was located over 160 miles northeast of the XVIII Corps' AVIMs, making air evacuation and MST support difficult.

did not provide the assets to carry all of their prescribed load list (PLL) items.

Current AVIM Mobility

The AVIM's mobility also fell short of the Army's future goals, and even short of current doctrine. Current doctrine requires the AVIMs to be 50-percent mobile. In ODS they were only about 25-percent mobile. By doctrine, the divisional AVIMs should move every 3 to 5 days to keep up with their supported units and to avoid being targeted by the enemy.

During the ground war, none of the AVIMs of XVIII Airborne Corps moved forward of the Saudi border. The only two AVIMs in VII Corps to move into Iraq during the ground war were in the aviation support battalions[3] of 1st and 3d Armored Divisions. The major reason sited for not following supported units forward was the lack of mobility.

During the early stages of the air war, several AVIMs moved as part of XVIII Airborne Corps' huge displacement to the northwest. These movements took several days during which time maintenance was greatly curtailed. Organic vehicles had to make multiple trips to move the whole battalion or company. Units found that they could not count on nonorganic transportation assets for movement because they were more urgently needed elsewhere.

Although many AVIMs had planned to move forward during the ground war, their supported units moved so far and fast that the AVIMs had no chance of keeping up. In the 101st Aviation Brigade, the air maneuver elements moved over 160 miles forward of the AVIM in less than 100 hours. This made slingload evacuation to the AVIM difficult.

The lack of organic transportation was not the only cause for the AVIMs' lack of mobility. Aircraft test equipment was too heavy and bulky. One AAR reported some civilian contract maintenance personnel could complete maintenance tasks with a small suitcase of test equipment.[4] The same tasks required our soldiers to use test equipment carried in a 6,500-pound CONEX. Because of its size, some test equipment was ill-suited for MSTs to take forward for battlefield repairs. Another problem that hindered the effectiveness of MSTs was the shortage of test equipment. Often, AVIM commanders would not let MSTs take a piece of needed equipment because it was the only one the AVIM had.

How To Close The Mobility Gap

The solution to this mobility gap is not merely to provide the AVUM and AVIM with more trucks and trailers. They must have smaller and more efficient test sets. The AVIM must have enough of these test sets that it can send MSTs forward with the equipment they need to fix the aircraft forward. When conducting training exercises, commanders should require their maintenance companies and platoons to try to load *all* of their equipment as if they were going to war. This would allow mobility problems to be found and overcome before they were discovered in the next conflict.

Both AVUM and AVIM need to have all of their tools, parts, and equipment stored in weather-proof containers with adjustable shelving. This would give them the ability to remain uploaded all of the time and to work right off the truck or out of the container. There is currently a family of containers[5] with up to 10,000-pound capacities which are fully compatible with internal loading requirements of CH-47 Chinook and Military Airlift Command aircraft. They are externally slingloadable. They can be carried in the back of a truck or made into a trailer with almost any customer provided mobilizer and an adapter kit. With available shelving and dividers, typically configured containers

have from 1 to over 5,400 discrete compartments for storing parts. Doors in both front and back of the container provide access to all compartments without downloading. U.S. Army Aviation Systems Command provided these containers to some units during ODS. The reviews were all superlative for providing both mobility and protection from the environment.

Current Mobility Versus Future Threat

When evaluating the lessons of ODS, it is important to remember the context of the war. We were fighting with total air superiority. There was little threat to our rear areas that would require the AVIMs to disperse or move often. The ground combat phase was over so quickly that maintenance conducted earlier was able to carry our aircraft through the war. Our next enemy could achieve local air superiority, insert forces or fire artillery into our rear area (or cause the ground war to last more than a week or two). If they did, the lack of mobility in the AVUM and AVIM could cause a serious degradation of combat power to the aviation brigades.

Aviation logisticians performed outstanding service in ODS. Never before has Army Aviation operated over such vast distances or under more grueling conditions with such a large force. Without the work of dedicated aviation logistics professionals, Army Aviation could not have completed its mission. It's time to give them the mobility they need to support AirLand Battle Operations.

End Notes

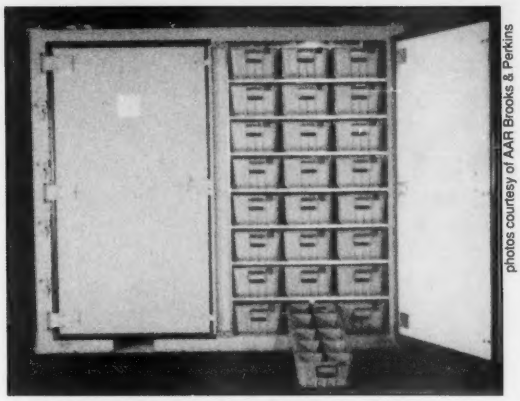
1. Major General Robinson made these remarks to the U.S. Army Aviation Center chapter of the Army Aviation Association of America, Fort Rucker, AL, on 20 September 1991.

2. AARs by U.S. Army Aviation Center; theater aviation maintenance officer (ODS) and executive officer, Theater Aviation Maintenance Program (Forward), for the Assistant Commandant, U.S. Army Aviation Logistics School, Fort Eustis, VA; and selected aviation brigades and battalions who served in ODS.

3. The division aviation support battalions (DASBs) in the 1st and 3d Armored Divisions (9th Battalion, Ist Aviation Regiment, and 9th Battalion, 227th Aviation Regiment, respectively) were test organizations. If adopted Armywide, the DASB may be designated as a forward support battalion.

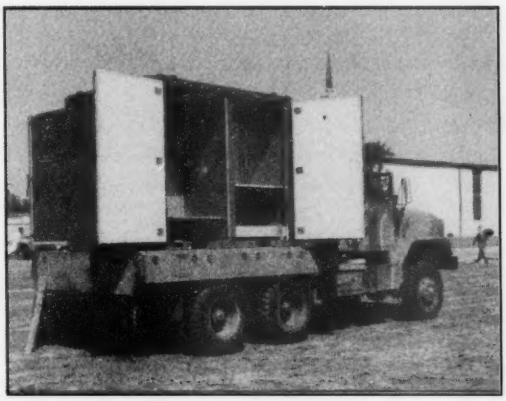
4. The manufacturer's test support set for the OH-58 Kiowa is carried in a suit case and exceeds the capability of the Army test set contained in a 6,500-pound CONEX.

5. For more information concerning local purchase authority, contact the Weapons Systems Manager for Aviation Ground Support Equipment (MAJ Light or Mr. John Denny), U.S. Army Aviation Systems Command (DSN 693-1713).

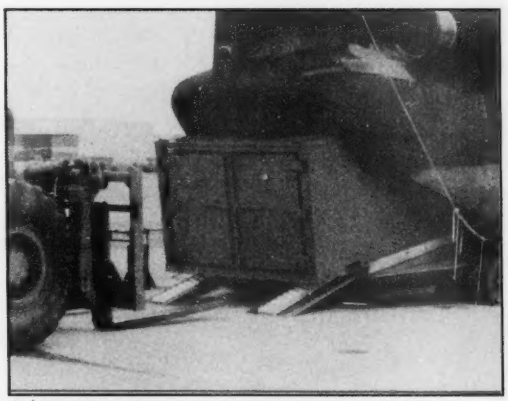


photos courtesy of AAR Brooks & Perkins

Containers equipped with shelving and trays would allow the movement of thousands of preorganized parts in one container.



Parts could be preorganized and ready for use immediately upon arrival in the theater of operations.



Containerized parts and equipment would allow maintainers to work right off the truck without downloading.

Army Chief of Staff to present the *Ellis D. Parker Award* annually to the best aviation battalion !

Lieutenant Colonel Gerald Hart
Public Affairs Officer
U.S. Army Aviation Center
Fort Rucker, AL

BEING ABOVE the best will take on a new meaning for one aviation unit each year with the creation of the new Ellis D. Parker Award.

The Chief of Staff of the Army will now recognize annually the best aviation battalion in the U.S. Army with presentation of the Parker Award.

The Parker Trophy will reward excellence achieved by an Army Aviation unit in training, maintenance, leadership, and safety during the preceding calendar year.

Army Chief of Staff General Gordon R. Sullivan established the award to recognize excellence in Army Aviation units. He announced the award during the retirement ceremony for Lieutenant General (LTG) Ellis D. Parker, Director of the Army Staff, on 31 January 1992.

As major general, Parker served as both the commanding general of the U.S. Army Aviation Center and branch chief of the Aviation Branch from January 1985 to September 1989. He provided masterful leadership to the Branch during those formative years.

For example, he oversaw the doctrinal development that expanded the airmobility role of the UH-60 Black Hawk and the attack capability of the AH-64 Apache. LTG Parker singled out pieces of Army Aviation and masterfully constructed them into what has become a continuing strong and viable force for the Aviation Branch.

Most recently, his vision of Army Aviation's role as part of the combined arms team was validated during Operation Desert Storm.

The Army Chief of Staff and the Chief of Army Aviation will present the first Parker Award at the Department of the Army Headquarters in Washington, DC, on 6 June 1992. The award will be presented annually on this date to commemorate the anniversary of the founding of the U.S. Army Aviation Branch, 6 June 1942.

Battalion-level units are eligible regardless of their organization, equipment, and mission. Aviation battalions of the Active Army, Army Reserve, or Army National Guard may be nominated in one of the three categories: combat, combat support, or combat service support.

The nomination process will be relatively simple. The aviation brigade commander, or equivalent, will recommend one of his battalions in the three categories. The first general officer in the chain of command will then endorse and forward the name of one of the units from his command.

The Commander of the U.S. Army Aviation Center, Ft. Rucker, AL, who is also the Chief of the Army Aviation Branch, will appoint the Ellis D. Parker Award committee annually. The Assistant Commandant of the U.S. Army Aviation Center will chair the committee consisting of eight members. One aviation command sergeant major, one aviation master warrant officer, and three to five company and battalion commanders will comprise the remainder of the committee.

Ellis D. Parker's name will always be synonymous with the foundation, building, and continuation of Army Aviation. His vision remains synonymous with Army Aviation's role in world peace.

It is proper, therefore, the best battalion in U.S. Army Aviation be honored with the Ellis D. Parker Award.

photo by Staff Sergeant Jay Llewellyn, U.S. Air Force

What is the SPH-4B?

Major Richard M. Carter, D.O., M.P.H.

U.S. Army Aerospace Medicine Resident in association with the U.S. Army School of Aviation Medicine, Fort Rucker, AL

Disclaimer: The views expressed in this article are those of the author and do not necessarily reflect official policy of any Department of Defense agency.

THE SOUND Protective Helmet Number 4B (SPH-4B) is here! Your SPH-4 has passed its 20-year mark in service to Army Aviation. The SPH-4 has served well.[1] The U.S. Army Aeromedical Research Laboratory (USAARL), Fort Rucker, AL, has carefully harvested this experience of 20 years' service. Based on studies of critical safety factors, the USAARL Aviation Life Support Equipment Retrieval Program (ALSERP) personnel created design requirements for a vastly improved SPH series helmet, the SPH-4B. These improvements will keep pace with demands of the modern battlefield, over which helicopters fly faster and lower than ever before.[2]

A New Helmet

Initial distribution of the SPH-4B began in July 1991. Though remarkably similar in appearance to the SPH-4, the SPH-4B is very much a new helmet (figure 1)! On closer inspec-

tion, a dual visor housing is noted. There is a subtle color change. A tough polyurethane paint that is more durable and subdued has replaced the enamel sheen of the SPH-4. Only the shape and communications system of the helmet are the same.[3]

Helmet Features

Chiefly, the SPH-4B has seven redesigned or new components (figure 2) as follows:

- Improved styrofoam liner.
- Thermoplastic Liner ™(TPL), Gentex Corporation.
- Energy-absorbing earcups.
- Improved retention assembly.
- Night vision goggles (NVG) mount.
- Dual visors.
- Kevlar™, E.I. duPont deNemours Company, shell (decreased weight).

The new styrofoam liner can absorb more impact energy in a crash sequence. The foam is less dense, and 25-percent thicker than the SPH-4. Reducing the density allows the foam to compress more easily, which decreases the energy forces transmitted to the head. The new styrofoam liner covers 20-percent more surface area of the head to further increase this protective barrier. The foam is more delicate, and less tolerant of rough handling, so don't jam that kneeboard into the helmet for storage!

Attached to the foam liner is the TPL™. This cloth-covered component consists of four, dimpled layers of plastic. The TPL™ replaces the sling suspension assembly of the SPH-4. Helmet fit is significantly improved by the TPL™. This device can be heated and custom molded to the crewmember's head when custom fitting is required.

The SPH-4B earcup is an important improvement in helicopter crash safety. The SPH-4B has energy-absorbing earcups that reduce the severity of side impacts. The ALSERP studies found lateral (side) helmet impact protection with the rigid earcups of the SPH-4 unsatisfactory. About 30 percent of helmet impacts during crashes involves blows to the lateral earcup area of the helmet.[4]

Hearing protection of the SPH-4B continues the successful tradition of the SPH-4. Any hearing protection device can be compromised through air leaks because of a poor airtight seal or from vibration. New earseal foam in the SPH-4B earcup contours to the head better and provides better consistency in hearing protection under field conditions. For better fit,

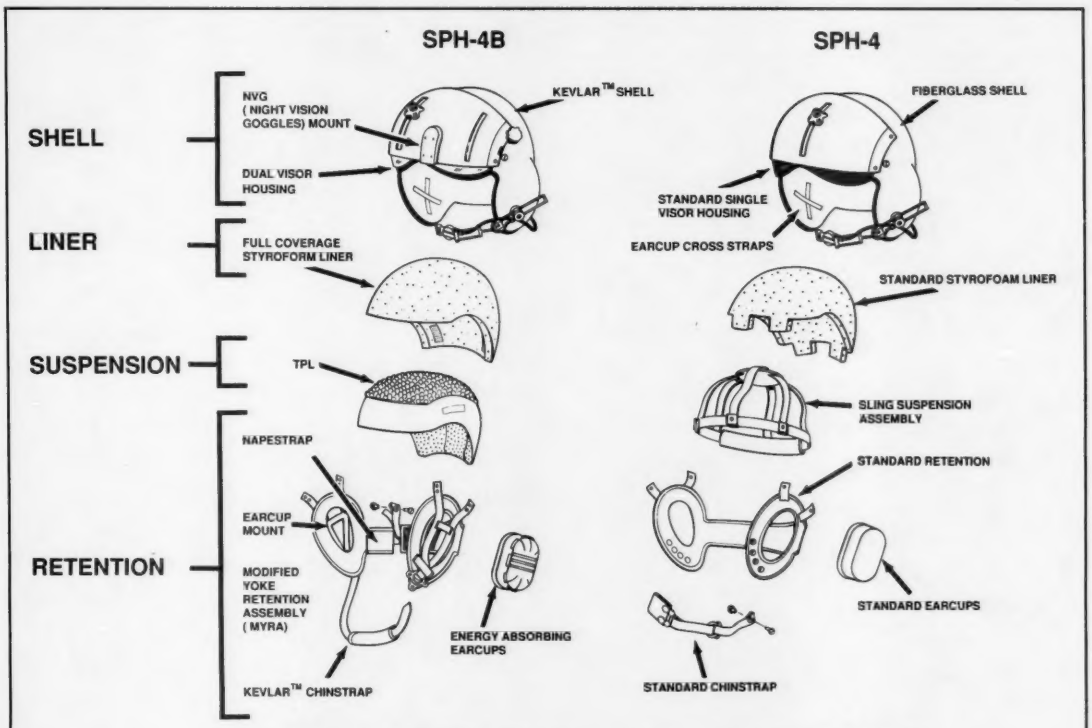


FIGURE 1: Comparison of SPH-4B and SPH-4

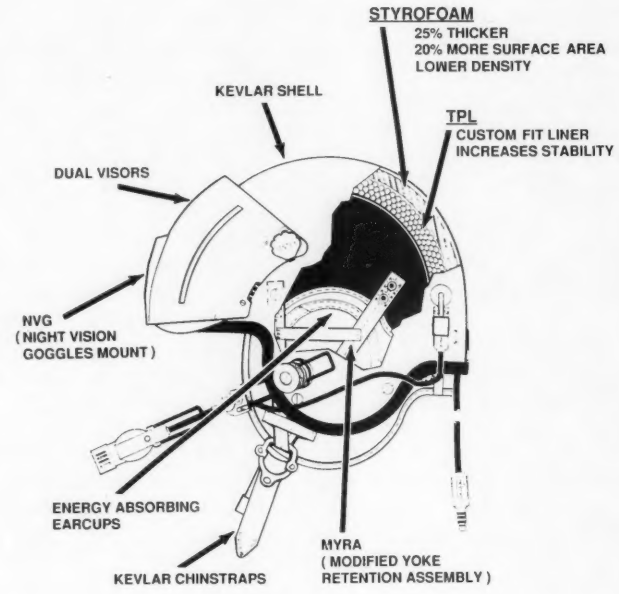


FIGURE 2: Improvements of the SPH-4B

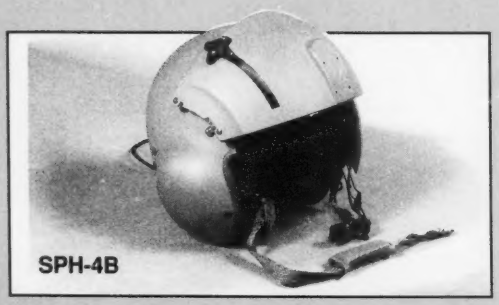
the height of the earcups can be individually adjusted through the retention assembly. As always, use of insert earplugs are recommended.

Retention involves factors that cause the helmet to resist detachment during crash events. The SPH-4B retention assembly has high-strength, low-stretch yoke chinstraps reinforced with Kelvar™ tape. This modified yoke retention assembly (MYRA), developed by USAARL, differs from the standard retention assembly of the SPH-4 in that the chinstrap of the MYRA is a continuous yoke extension of the helmet shell attachment mechanism in the earcup mount of the retention assembly. Retention of the helmet is improved by proper adjustment of the dual rear system of napestraps and the chinstrap. The yoke style chinstrap uses a double 'D' ring. Some practice is required to easily loosen and tighten the chinstrap when wearing aviator gloves; however, a simple method to solve this inconvenience is to don the helmet *after*

Helmet Fit Check for SPH-4B

Proper selection of helmet size is important. Like the SPH-4, there are two sizes. The helmet should have a snug, comfortable fit.

Don the helmet and tighten napestrap. Check position of earcups. Earcups should be adjusted in height to fit well over the ears. Earseal compression should be firm, to about one-half compression of the earseal. If needed, tighten cross straps, and use earcup spacer pads. The distance from eyebrows to helmet shell rim should be about 3/4 inch when the helmet is properly seated.


SPH-4B

Lower visors to check operation. The visors should move smoothly and evenly. If not, adjustment is needed to the visor housing tracks. This procedure requires some experience.

Check for hot spots. The TPL™ can be custom molded for comfort. It is wise to attach the complete NVG complement to the helmet to assure the best fitting outcome.

the chinstrap is properly positioned in the D ring. You will find you have ample room to put the helmet on. Motorcycle riders should find the D ring similar to cycle helmets.[5]

The dual visor assembly consists of a visor housing that provides a platform for NVG attachment. For some crewmembers, the SPH-4B may appear to limit tilt angle and eye relief while using the aviator night vision imaging system. This problem usually can be resolved by remolding the TPL™ with NVG attached to the helmet. For this process, assistance from your aviation life support equipment (ALSE) technician is recommended.

Dual visors are an additional feature of the SPH-4B. This design eliminates the awkward, single-visor replacement procedures of the SPH-4. Visors are polycarbonate with an abrasion-resistant coating. Ultraviolet protection is incorporated into the polycarbonate material used. The visors are designed to withstand impact from a high-velocity, fragment projectile. The visor actuation is adaptable for right- or left-handed use. Optional multiband, laser-protection visors are available.

Kevlar™ replaces the fiberglass cloth and epoxy resin shell of the SPH-4. A unique, lightweight fabric weave of Kelvar™, composed of aramid (nylon) fibers is used. Compared to the SPH-4, the SPH-4B weighs about 1/2 pound less. The SPH-4B shell also is less rigid, which contributes to improved impact protection. A less rigid shell can "give," allowing more impact energy to be absorbed.

Upgrade of the SPH-4

Because of similar helmet shape, components of the SPH-4B are compatible with the SPH-4. Your ALSE personnel will be able to order and install the new foam liner, TPL™ kit, universal retention system kit, crushable earcup kit, dual visor kit, and housing assembly kit.

The contract for a single, multi-item kit to completely upgrade the SPH-4 is not currently available to your ALSE technician; he must order the various parts by individual stock numbers. The conversion is somewhat complex, but "do-able" for a school-trained ALSE technician.

The Next Generation

The new generation of flight helmets, the SPH-4B, advances the legacy of protection for aviators handed down from the SPH-4. The SPH-4B incorporates many of the technological advances gleaned from development to produce the next generation of flight helmets, the Head Gear Unit Number 56 Personal (HGU-56P). The HGU-56P will provide even greater impact protection, but weigh no more than fixed-wing helmets that offer far less impact energy protection.

ENDNOTES

1. Major John V. Barson, "New Things in Old Packages? The Improved SPH-4 is Coming!" *U.S. Army Aviation Digest*, January 1989, pp. 16-17.
2. Ronald W. Palmer, "SPH-4 Aircrew Impact Protection Improvements 1970-1990," USAARL Report No. 91-11, Fort Rucker, AL, February 1991.
3. Leo Unruh, Gentex Corporation Product Manager, Aircrew Helmets, Carbondale, PA, personal communication.
4. D.F. Shanahan, "Basilar Skull Fracture in U.S. Army Aircraft Accidents," *Aviation Space Environmental Medicine*, 1983, Vol. 54, pp. 628-631.
5. Joe Licina, Life Support Equipment/Crew Injury Branch, USAARL, Fort Rucker, AL, personal communication.

Acknowledgement: The author is truly indebted to Mr. Joseph L. Haley, research engineer, U.S. Army Aeromedical Research Laboratory (USAARL), Fort Rucker, AL. His expertise greatly contributed to the core content of this article.

Glossary of Helmet Safety

Earcup assembly - Plastic cup and earphone inserted into the retention assembly in the lateral portion of helmet.

Energy attenuation foam liner - Polystyrene material of variable density and thickness that compresses when exposed to impact energy.

Impact protection - Factors that reduce head impact energy and resultant injury.

Kevlar™ - High-tensile strength nylon (aramid) material that contributes lower overall helmet weight.

Noise attenuation - Hearing protection accomplished by fit, seal, large volume (size), and sound absorption of the earcup assembly.

Retention - Factors that resist detachment of the helmet during the crash and post-crash sequence.

Stability - Comfort and fit of the helmet; how firmly the helmet fits during head movement, with or without attachments.

TPL™ - Thermoplastic Liner. A custom molding device that aids helmet stability and comfort.

Visor - Polycarbonate shield that provides continuity in optical quality through the full visual field of the visor. When locked in position over the face, protects you from high-velocity projectile impact.

Helicopter School of the Americas

Lieutenant Colonel Jose L. Hinojosa
Commander, Helicopter School of the Americas
Fort Rucker, AL

THE SCHOOL OF the Americas (SOA), Fort Rucker, AL, has added a new dimension to its unique bilingual military educational institution. Since its inception in 1946, the SOA has trained more than 54,000 officers, cadets, and noncommissioned officers from Latin America and the United States. This new dimension is the Helicopter School of the Americas (HSOA) also located at Fort Rucker, AL.

As the former U.S. Southern Command Platoon, and E Company, 1-223d Aviation Battalion, Panama, this unit has trained more than 420 flight students from Bolivia, Colombia, Ecuador, El Salvador, Honduras, Mexico, and Peru since 1984. Its mission was to provide initial and advanced helicopter flight instruction in Spanish to Latin American aviators.

Its new mission will be to train aviation personnel to meet Latin American requirements in all helicopter and related occupational specialties; provide assistance, evaluation and standardization; provide tactics and techniques for aviation employment; and assist in developing doctrine, concepts, training, and materiel requirements for Latin American countries.

With the establishment of the HSOA and the expansion of the mission, Latin America now can depend exclusively on one agency to provide all helicopter-related training. Unlike the Inter-American Air Force Academy, Homestead Air Force Base, FL, the HSOA will train personnel from all services to include the Army, Air Force, Navy, Marines, and the National Police.

Funding for the HSOA is provided primarily through course-cost reimbursements from three programs: Foreign Military Sales, International Military Education and Training, and International Narcotics Matters.

The demand for helicopter flight and maintenance training, in Spanish, is great. The total projected number of students for this fiscal year (FY) is 225, almost a 100 percent increase from last year (figure 1).

The HSOA will be fully organized in three phases and prepared to fulfill its mission within the next 2 years. Phase I is the activation of headquarters and company A, and a small cell in companies B, Fort Rucker, AL, and C, Fort Eustis, VA, respectively. The Headquarters and Headquarters Detachment (HHD) will provide command and control, administrative and logistical

COURSE	FY 92	FY 93	FY 94	FY 95
UH-1 Huey INITIAL ENTRY	16	9	17	7
UH-1 Huey QUALIFICATION	26	26	15	15
UH-1 Huey TRANSITION	10	10	7	10
UH-1 Huey NIGHT VISION GOGGLES	18	20	22	10
UH-1 Huey INSTRUCTOR PILOT	14	9	6	5
UH-1 Huey INSTRUMENT REFRESHER	110	116	103	107
UH-60 Black Hawk QUALIFICATION	5	5	5	5
UH-60 Black Hawk INSTRUMENT REFRESHER	26	26	26	66
TOTAL	225	221	201	225

FIGURE 1: Number of students per course projected through FY 1995

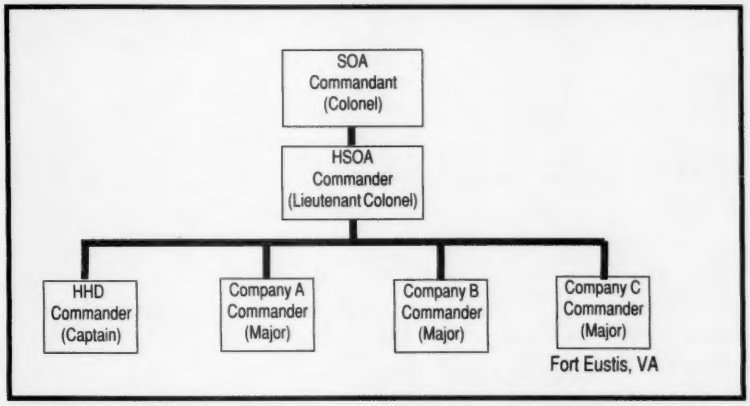


FIGURE 2: Diagram of Helicopter School of the Americas structure.

support, and all academic flight instruction for the flight courses taught in company A (figure 2).

Company A will provide all approved flight instruction. Presently, company A provides flight instruction on eight different courses as follows:

- The UH-1 Huey Initial Rotary Wing Qualification Course (20 weeks)
- The UH-1 Qualification Course (11 weeks)
- The UH-1 Pilot Instructors Course (6 weeks)
- The UH-1 Night Vision Goggles Course (4 1/2 weeks)
- The UH-1 Transition Course (4 1/2 weeks)
- The UH-1 Instrument Refresher Course (2 1/2 weeks)
- The UH-60 Black Hawk Transition Course (6 weeks)
- The UH-60 Flight Instrument Course (2 weeks)

Companies B and C will provide all aviation maintenance instruction. During this FY, both companies will develop programs of instructions and submit them for approval; gather all instructional material and translate it into Spanish; and prepare to teach all courses during FY 1993.

Company B, Fort Rucker, AL, will be responsible for teaching the following courses:

- The Aviation Maintenance Test Pilots Course (13 weeks)
- The UH-1 Basic Mechanic Qualification Course (10 weeks)
- The UH-1 Supervisor and Technical Inspector Course (12 weeks)

Company C, Fort Eustis, VA, will be responsible for teaching the following courses:

- The Engine Repair Course (16 weeks)
- The Powerplant Repair Course (13 weeks)
- The Electrical Systems Course (20 weeks)
- The Structure Repair Course (15 weeks)

During Phase II, the HSOA will be ready to provide flight and maintenance instructions on the courses at the left. Also, the HSOA will expand to develop a small team of experts in aviation and aviation maintenance to assist any Latin American country. Upon request, the HSOA will assist these countries in developing aviation doctrine, tactics, techniques, procedures for aviation employment in the unconventional warfare arena; and requisite aviation maintenance and maintenance management programs to support their aviation mission.

Phase III will focus on expanding instruction, in both aviation flight and aviation maintenance, to meet any added requirements within Latin America. As indicated, the only flight instruction presently being provided is in the UH-1 and the UH-60 courses. We hope to expand the OH-58D Kiowa (observation helicopter) and the AH-1 Cobra (attack helicopter) courses to all Latin American countries as the need arises, or upon request.

The SOA is committed to its charter of developing and conducting the most doctrinally sound, relevant, and cost-effective training programs possible. This charter is maintained by promoting military professionalism; fostering cooperation among the multinational military forces; and expanding Latin American armed forces' knowledge of U.S. customs and traditions .

The SOA continues to apply great foresight in establishing an outstanding, credible institution that provides first-class instruction in a multitude of subjects to assist Latin American neighbors and allies with internal defense.

Where do we go from here?

by Mr. Eugene H. Grayson
Professor of Military Operations
U.S. Army War College
Carlisle Barracks, PA

This article summarizes how Army Aviation arrived at its current decisive place as a combat multiplier and addresses the direction Army leaders should take in restructuring the ***Aviation Force*** to preserve an effective and responsive Army.

Army's leaders and planners face tough problems regarding significant personnel and force reductions expected to take place throughout the next 5 years. They will examine all combat, combat support (CS), and combat service support (CSS) units and systems that possibly will be affected during this drastic drawdown.

Because of the tremendous costs associated with its current and planned systems, Army Aviation will not escape this effort to reduce defense expenditures. Thus, Army Aviation will be examined as units return home, divisions fold their colors, and innumerable other units reduce in size or are retired from active service.

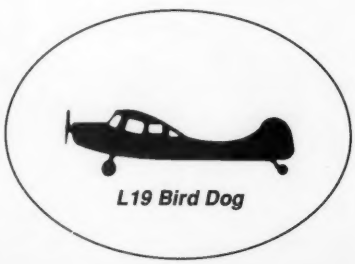
Despite these reductions, the need to maintain a highly effective and responsive Army will remain. In fact, the Army's contingency requirement is likely to increase with the present turmoil and uncertainty existing throughout the world. The requirement to maintain a rapidly deployable, effective fighting force that can fight in any continuum, from low- to high-intensity, is more critical than ever.

Since its inception in 1941, Army Aviation has played a progressively increasing role on the battlefield. Today, aviation, as we know it, has become an integral member of the ground commander's combined arms team; however, the road has been difficult. At every turn, the aviation community has had to face many obstacles as well as those individuals who have doubted its potential in the combat and CS environment.

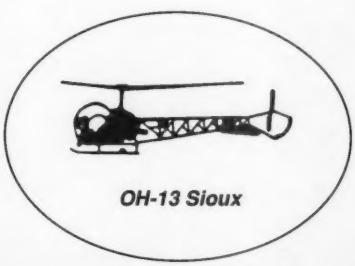
During World War II, light aircraft flown by Army pilots supported combat operations in Sicily and Italy. Later, in France and Germany, Army pilots were used primarily as forward observers for artillery and tactical air, although they also flew intelligence, liaison, courier, and command and control (C^2) missions.

During the Korean War, light aircraft performed these same roles with increased frequency. However, a new system arrived on the battlefield that would dramatically change future roles and missions of Army Aviation to support the ground commander: ***the helicopter.***

We all have watched the popular television show M.A.S.H. and have seen the vital role performed by the H-13 Sioux, a rotary-wing, utility aircraft, during numerous battlefield medical evacuations. Another helicopter, the H-19 Chickasaw, arrived in Korea in late 1952. Transportation companies equipped with H-19s immensely enhanced both troop movement and resupply operations. (Note: The H-19 did not arrive in time to prove its total utility on the battlefield during the height of the Korean War partly because of the



L19 Bird Dog



OH-13 Sioux

vigorous efforts of the U.S. Air Force to prevent the development and testing of the aircraft.)

UH-19 Chickasaw

Moreover, the U.S. Marine Corps is credited with the first combat assault, using the helicopter, during the Korean War. It was only a matter of time before this new innovative combat multiplier would become an important part of combat operations planning and execution for the Army.

In addition, the French carried a myriad of helicopter missions during the Indochina War and later in Algeria; they developed their own air assault concept by providing armed helicopter escorts for troop-carrying helicopters and landing-zone support. It did not take the U.S. Army long to appreciate the nuances and capabilities of this innovative system.

All aviators are familiar with the exciting developments during the Howze Board tests; the subsequent creation of the 11th Air Assault Division; and later deployments and combat in South Vietnam by two airmobile divisions, an aviation brigade, aviation groups, and multiple aviation battalion- and company-size units. The results unquestionably speak for themselves: no single combat element played a more significant role during the 10 years of American involvement in Indochina than did Army Aviation.

During the 1972 Easter Offensive in South Vietnam, and later the Yom Kippur War in the Middle East in 1973, emerging battlefield systems dictated radical changes in combat aviation tactics and employment. Aviation units would continue to play an effective role on a highly technical and sophisticated battlefield. They had to devote maximum effort toward developing new tactics and procedures to continue their role as a combat multiplier and to ensure survivability.

During this period of radical breakthroughs in tactics and new weapons systems, a major reorganization took place. Among other changes, the ***combat aviation battalions*** were assigned as organic units to Army divisions. Nowhere was this more significant than in Europe, where the potential of the AH-1S Cobra, with its highly effective TOW missile, was integrated rapidly into every operational defense plan.

AH-1 Cobra

Now for the first time, the division commander had an organic unit unencumbered by terrain obstacles. The unit provided an extremely rapid response capability. It could arrive at any decisive point along the forward line of own troops and deny the enemy the chance for potential breakthroughs. Moreover, this new arrival offered a unique opportunity for daily, integrated training with each combat, CS, and CSS unit as was previously done by the division's other organic battalions.

This capability proved to be a great learning experience for both aviation and ground unit commanders. After several Return of Forces to Europe (REFORGER) and other major field training exercises, the combat effectiveness of what this new unit could add to the fighting capability of the division became readily apparent to the division's ground commanders. With the arrival of the UH-60 Black Hawk, the AH-64 Apache, the improved OH-58D Kiowa, and the modernized CH-47 Chinook, aviation

UH-60 Black Hawk

AH-64 Apache

OH-58D Kiowa

further enhanced its stature in every aspect of combat and support.

CH-47 Chinook

With the time-tested and proven record of Army Aviation, key decisionmakers and war planners must consider two elements before making the tough decisions on personnel and force cuts. To paraphrase a quote from General Nathan Bedford Forrest, "Whoever gets there first with the most will gain the initial advantage."

Thus, a more significant role for Army Aviation units than ever before should be considered seriously. As U.S. Forces begin to withdraw from overseas, and the stateside drawdown occurs, the contingency role for the forces remaining in the Total Army becomes more significant than ever.

Whatever size Army (Active and Reserve) is left must have a rapid response capability. Our Army must be capable of moving to a port or airfield of debarkation, on-loading rapidly, being airlifted, and being quickly employed upon arrival.

Nowhere in the current force structure is there a combat element more adequately tailored than Army Aviation to deploy and fight against any force. Certainly the 82d Airborne Division at Fort Bragg, NC, can rapidly upload, deploy, and parachute into a hostile area. However, what if the enemy is an armor- or mechanized-heavy force and launches an immediate offensive? If a division aviation brigade, or a representative slice thereof, is airlifted in immediately after the seizing of an airfield, the armored vehicle kill potential of the division increases dramatically as does the mobility necessary for moving ground units as required.

Unlike an armored or mechanized division, combat aviation brigades are air transportable. As has been shown through practice rehearsals and actual air movement exercises, Aviation brigades are a fairly rapid deplorable force. In fact, it is difficult to imagine any light force deploying into a hostile environment, whether low-, mid-, or high-intensity, without its organic aviation assets coming in once a secure airfield has been gained.

Self-deployment by Army Aviation units should require additional emphasis within the contingency area to effect a more rapid projection into a theater of operations. With an external fuel capability available (or internal in some cases), it is likely that the Apache, Black Hawk, Chinook, and RAH-66 Comanche (when it joins the inventory) can be configured for self-deployment missions over fairly extended distances.

Self-deployment through the Caribbean Basin into U.S. Army Southern Command area of operations is well within our current capability. Similar deployments into a European scenario are not out of reach and could be considered in any future contingency plans.

From a Central Europe base, self-deployment into any contested area, to include the Middle East, is well within current flight limits. The Pacific will remain a formidable obstacle. Airlifting aviation units into a secure base followed by a rapid reconfiguration of aircraft should allow a fairly responsive commitment into a contested area.

The bottom line is that nothing in the current inventory can arrive as rapidly into a combat theater, with as much firepower and the capability to perform over a multitude of battlefield missions, as the present divisional aviation units. Back in 1957, Colonel Bob Williams flew an H-21 Shawnee nonstop from San Francisco, CA, to the Pentagon, Arlington, VA, and refueled in-flight from an Otter. In 1963, I planned a deployment by the 227th Aviation Battalion from Fort Benning, GA, to Trinidad. That was a long time ago and these systems are no longer around. Surely in 1992 we can do much more in the self-deployment arena.

CH-21 Shawnee

What the Army has in its ***aviation brigades*** is an ideal force, one fully capable of rapid deployment. This is the ideal force to fight, or to support the fight, in any combat environment. Furthermore, besides its devastating HELLFIRE system, long-range rocket fires, and excellent direct fire

weapons against softer targets, the aviation brigade provides the ground commander the following: immediate C^2; intelligence and reconnaissance; and sling-load and troop-lift capability immediately upon arrival and thereafter.

Aviation units will play a decisive role on the nonlinear, wide-open battlefields we are likely to encounter in the future. It would be unwise, therefore, to drastically reduce the size and scope of such a vital asset to the division. Instead, planners might consider reducing maneuver brigades by one company, artillery battalions by one battery, transportation units by one truck platoon, etc., to meet force structure ceilings. To lose the capability of what is arguably the most decisive element in the division commander's repertoire could be tragic on future battlefields.

Another concern is ***where the aviation brigades will be assigned***. As indicated earlier, the brigade is exactly where it can enhance combat operations most effectively—at the division level—not at the corps. The thought of the corps commander's retaining some 200 fighting and support helicopters under his direct control to deal with particular situations is disturbing to many visionaries.

The aviation brigade simply cannot be viewed the same as corps engineer, transportation, or maintenance brigades. Aviation is not designed to remain in reserve, or to be "farmed out," depending on the tactical situation. The corps will optionally retain its organic aviation brigade, which, like the corps artillery, will reinforce or provide added firepower to a division at a critical time when released by the corps commander. In an ill-fated historical precedent, the Army went through this once before in a previous war, when, on a daily basis, helicopters were allocated to each major ground unit, whether planned for or not. To ensure the helicopters would return the next day, they would be used in some fashion, whether needed or not. Moreover, there was no close identity between the aviation and ground units since, in all likelihood, the same aviation unit would not arrive the next day. This has not been the case, since the aviation brigade is the division's fourth brigade, and the aviation commander is on the same level as the other brigade commanders.

Some think the light divisions will retain their aviation brigades, while the armored and mechanized divisions will lose theirs to the parent corps. Again, this would be a major mistake. It is likely that future Operation Desert Storms will occur. Allied and Soviet ground forces may not clash on the old inter-German border; however, a confrontation may take place elsewhere in Europe. In any case, the heavy divisions would undoubtedly bear the brunt of such a war. Having their own organic aviation brigade could very well mean the difference between victory and defeat. Many afteraction reports from the heavy divisions in the desert indicate that, as the tanks and Bradleys moved forward and reached target areas, the targets had already been engaged and destroyed or neutralized by their attacking aviation units. The day and night, all-weather capability; the killing ranges out to 4,000 meters; the vital role as the commander's eyes and ears; and the myriad of other missions perfected over years of assignment to the division in developing results-oriented battlefield tactics cannot, and should not, be replaced.

In particular, the enhanced night capability of the division's organic aviation brigade cannot be overlooked. Years of training with parent divisions during countless night training missions have resulted in the aviation brigade's becoming an integral and full partner in around-the-clock operations. Nowhere was this night fighting capability demonstrated more than during Operation Desert Storm.

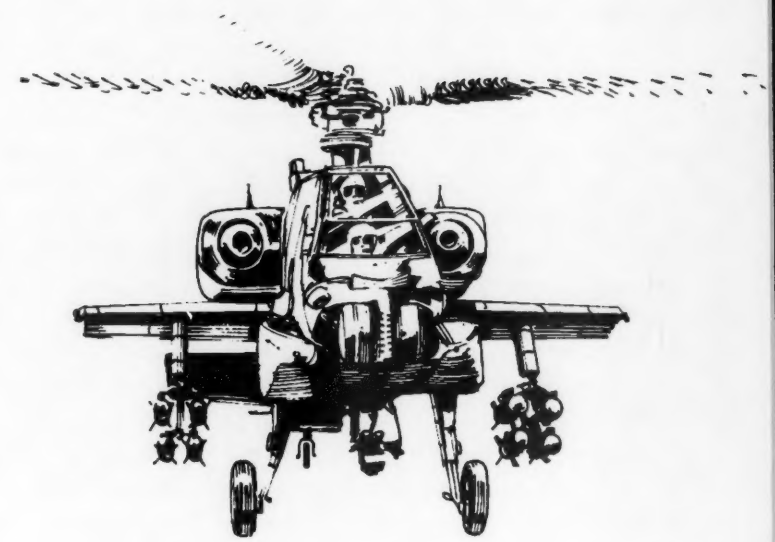
Emerging doctrine shows the division as the centerpiece on the future battlefield. The organic aviation brigade ***must*** be there as an integral element, whether on a linear or nonlinear battlefield, in a jungle environment, or wherever the next war might occur.

It took too many years to get Army Aviation reorganized, equipped, and trained, and assigned at the right place as the fourth brigade of the Army's divisions. As countless National Training Center rotations, REFORGERs, and the recent war in the desert have proven, the aviation brigades must be assigned to the divisions. Their importance as a combat multiplier is as essential to the division as that of the maneuver brigade. Now is not the time to take a great step backward, and move them back to the corps, as some would suggest. ■

The "Bag"

An Exercise in Mental Gymnastics

by Chief Warrant Officer (CW3)
Ken Shannon



Chief Warrant Officer (CW 2) Killer wakes in the middle of the night, drenched in a cold sweat. Nightmarish images drift through his mind. A feeling of dread, coupled with a fear of the unknown, invades his thoughts. Tomorrow morning at 0'dark thirty, he begins "Bag" training in the AH-64 Apache.

Every AH-64-qualified pilot has experienced some form of apprehension coupled with excitement during the AH-64 Aircraft Qualification Course (AQC). What makes this "Bag" training so difficult? There seems to be no correlation between experience and mastery of the pilot night vision sensor (PNVS) system. Proficiency varies from one person to the next despite flight time, night vision goggle (NVG) time, and night time. So, why does it require 26 hours of training to do basic maneuvers such as hovering and normal traffic patterns? There are no simple answers, but I believe the following information will help demystify this enigma.

PNVS Training

First, for those who are not familiar with the "Bag," it is simply an expedient to save training dollars. All PNVS training could be conducted at night, but one must consider the risk involved. During night training the instructor pilot (IP) must expend 80 percent of his attention and efforts to aircraft control and safety, which results in only 20 percent of his efforts expended on training. During day training, the back seat cockpit is covered with blackout curtains, and the IP in the front seat is daytime. As a result, these percentages can be reversed, thereby reducing the total time required for instruction.

The "Bag" does produce many obstacles to learning that are not related in any way to flying. Some individuals are claustrophobic, while some have panic attacks. It is difficult to see inside the cockpit without some form of lighting, which leads to a competition of dominance between the left and right eye called binocular rivalry. Also, there is a parallax between the sensor and the pilot's eye position—the sensor is 10 feet in front of and 3 feet lower than the pilot's eye. With these obstacles alone, extensive mental gymnastics are required merely to create a reasonable learning environment.

Let's now look at the assimilation of new information or the development of a cognitive element. This information is merely my opinion about PNVS training. I am neither a doctor of philosophy nor an educational psychologist. However, my opinion is based on 5 years of instructing the PNVS. Information from old and new IP handbooks also supports my opinion.

When an individual is exposed to new information in a learning environment, a new cognitive element of the brain begins. Information is assimilated, meaning is applied, decisions are made about the priority and the importance of the information, and a comparison is made between previously exposed information.

Once this occurs, an individual has a reasonable basis for decisionmaking, but it requires experience to reinforce and strengthen this cognitive element. PNVS training is not an extension of a previously learned skill, but the development of an entirely new cognitive element. Basic helicopter flight skills are the same for day or PNVS. The difference is the perception or information the brain receives to apply those flight skills. Therein lies the challenge of learning a new cognitive skill in a totally enclosed environment. Because of this unusual environment, the pilot must overcome two obstacles before he can achieve true progress and understanding.

Orientation

The first obstacle in the "Bag" is orientation. When we, as humans, walk from point A to point B, our sense of balance and movement are based on a mental plane that I call a null line. All decisions of movement and balance are based on either up, down, right, or left of this line. This line is not always certain because of factors that can interject an adverse influence, such as vestibular and visual illusions. These influences merely reinforce the idea that this null line is extremely important when learning a flight-related skill.

If one recalls, during the first days of learning to hover, one could hover only while looking straight ahead. If one looked to the left or right, aircraft control was lost and loud verbal IP corrections began.

The same is true when learning to fly NVGs and PNVS. During day flight and NVG flight, this null line is easily established because of peripheral vision and aircraft structural members as they relate to the seat position. This critical reference is removed in "Bag" flight. Simply, no outside or inside visual reference exists to tell us when we are looking straight ahead. The only available cue is the headtracker, which is superimposed symbology, that represents the nose of the aircraft. If the line of sight (LOS) is skewed to the left or right of the headtracker, the brain interprets this to be straight ahead and makes all decisions based on this incorrect perception. Figures 1 and 2 illustrate my point. The pilot in the "Bag" is hovering over the lane. His LOS is oriented to the left of the nose.

The pilot perceives the aircraft to be directly behind him or perfectly aligned with the lane. The aircraft begins to drift to the aft right quadrant. The video of the lane is seen by the pilot as moving from the bottom of the field of view (FOV) straight to the top, which is interpreted as moving straight back. The pilot applies forward cyclic, which stops the aft movement of the drift but not the right movement. The brain, under the as-

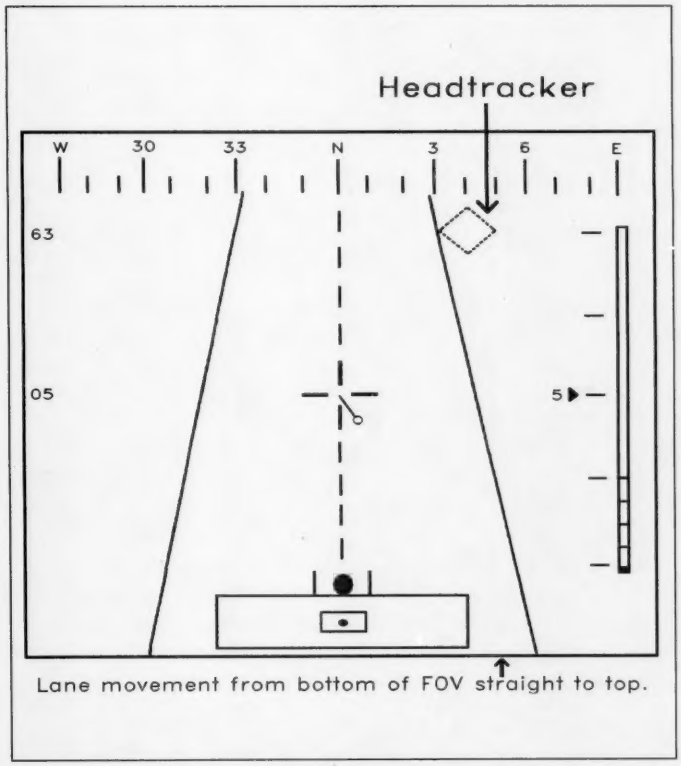


Figure 1. Video as it would appear to pilot.

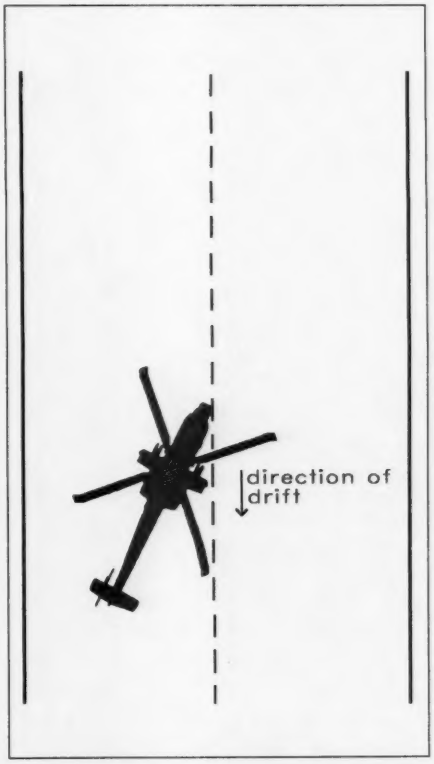


Figure 2. View of helicopter on the lane.

sumption that a correct input was made, does not understand the continued right drift, and the result is the pilot overcontrols the aircraft.

If correct orientation is reinforced strongly from the first day of training onward, problems of this nature are eliminated. The video and aircraft should be as shown in Figures 3 and 4.

Attitude Reference

The second obstacle in the "Bag" is attitude reference. In day flight, a pilot uses airframe reference as it relates to the horizon to maintain pitch and roll. (*Example*: If the pilot sees the chin bubble frame backgrounded by blue sky, he probably has an excessive pitch attitude. It does not take a mental giant to make that determination.)

In the "Bag," however, this determination becomes a different animal. The pilot lacks outside references to pitch attitude. If the nose of the aircraft pitches up and the pilot looks down with the PNVS, there will be no apparent pitch attitude change, except one piece of valuable information—the computer-generated horizon line. (Example: The horizon line can move up and down, but the video remains the same. Conversely, the horizon line can remain the same, but the video moves up and down.) Once a pilot understands the correlation of video movement, horizon line, and aircraft attitude, he is well on his way to his PNVS qualification.

Conclusions

These two basic obstacles, orientation and attitude reference, must be understood before correct meaning can be applied to the information perceived by the pilot. Once these obstacles are understood and correct meaning is applied, flying PNVS proficiently can be attained quickly and with less frustration. Application of these basic principles for a qualified pilot will enable him to remain proficient for a longer time between PNVS flights. It has been shown that PNVS skills are very perishable. Currency here does not mean proficiency.

There are no secrets. Learning how to fly PNVS is not an insurmountable task, but no one said it was easy. All you need is an open mind, a willingness to learn, and a great attitude. If you are looking forward to the AH-64 AQC, do not be discouraged. The AH-64 is a wonderful aircraft to fly. It is worth a little sweat and a few sleepless nights.

CW3 Shannon is the Standardization and Training Officer assigned to Company D, 1st Battalion, 14th Aviation, Aviation Training Brigade, U.S. Army Aviation Center, Fort Rucker, AL.

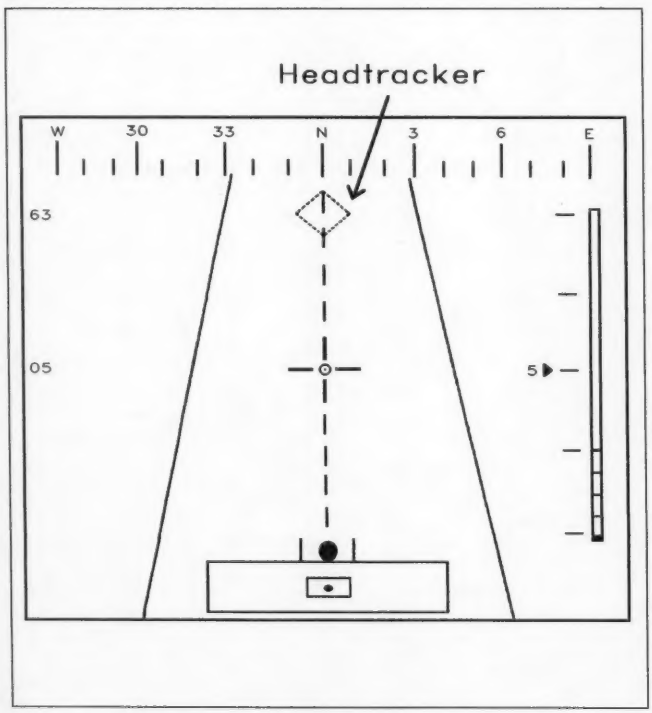


Figure 3. Video shows correct position of headtracker and correct orientation.

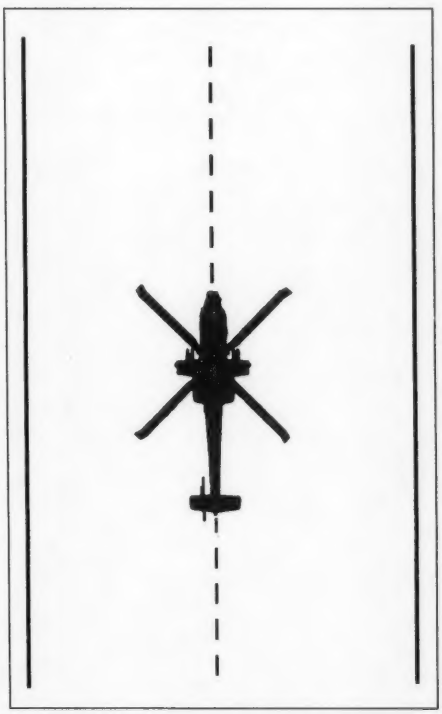


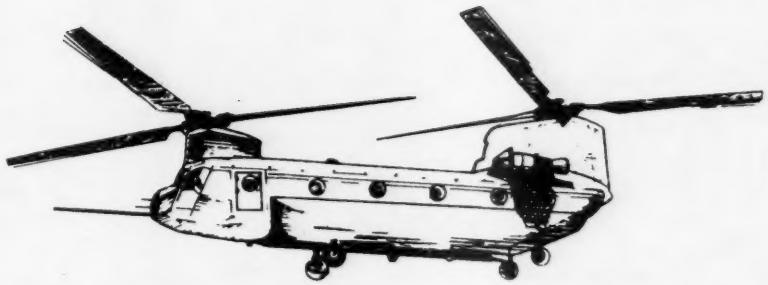
Figure 4. Correct perception of aircraft on the lane.

DES Revises CH-47D Operator's Manual and -CL

by Mr. Stephen M. Harris

From 25 through 28 October 1988, the Directorate of Evaluation and Standardization (DES), Fort Rucker, AL, held a user review on Technical Manual (TM) 55-1520-247-10 and the Checklist (-CL). During this conference, the entire operator's manual and -CL were reviewed, and suggested changes were prepared and sent to the U.S. Army Aviation Systems Command (AVSCOM), St. Louis, MO, for coordination and future change.

This article informs you, the operator, of some of the major changes in the new manuals. It helps explain the rational behind the changes and answers some questions that you may have after reviewing them.



CHAPTER 9

First, the CH-47D Chinook Operator's Manual was the last one to have chapter 9 totally revised and procedures simplified. This revision was based on a U.S. Army Research Institute study conducted in the early 1980s. That study indicated that the ideal number of emergency steps a pilot should be required to commit to memory should be no more than three or four. TM 55-1520-237-10, UH-60 Black Hawk, and TM 55-1520-238-10, AH-64 Apache, Operator's Manuals were used as examples to revise the CH-47D Operator's Manual. With the exception of one emergency procedure, Smoke and Fume Elimination, which has five underlined steps, the remaining emergency procedures contain only three or four underlined steps. To help reduce steps and simplify the remaining procedures, three new definitions of emergency terms were added to paragraph 9-3. These terms include the following:

AUTOROTATE, which is defined as adjusting the flight controls as necessary to establish an autorotational descent and landing.

1. THRUST control—Adjust as required to maintain rotor revolutions per minute (RRPM).
2. Pedals—Adjust as required.
3. Cyclic—Adjust as required.

EMERGENCY ENGINE (EMER ENG) SHUTDOWN, which is defined as engine shutdown without delay. Engine shutdown in flight is usually not an immediate-action item unless a fire exists. Before executing an engine shutdown, identify the effected engine by checking indications of torque, RRPM, gas producer (speed) (N1), power turbine inlet temperature (ptit), and engine oil pressure.

1. ENGINE CONDITION (ENG COND) lever—STOP.
2. FIRE PULL handle—PULL (engine fire only).
3. AGENT DISCHARGE (AGENT DISCH) switch—As required (engine fire only).

ABORT START, which is defined as engine shutdown to prevent ptit from exceeding limits or whenever abnormal operation is indicated. If high ptit was indicated, the engine must be motored to decrease ptit below 260 degrees Celsius (C).

1. ENG COND lever—STOP.
2. ENG START switch—MTR (if high ptit is indicated).

After you understand these terms commit their steps to memory, you will find the remaining emergency

procedures within the chapter use these terms as a step in the new revised procedures. A good example is the emergency procedure in which the crew has no choice but to land in the trees and two of the terms have been used—

9-56. Landing in Trees.

External cargo must be jettisoned as soon as possible. If a landing in trees is imminent, it is important to stop the forward motion of the helicopter before entry into the trees.

Power on:

1. Approach to a hover—5 to 10 feet.
2. EMER ENG SHUTDOWN.
3. AUTOROTATE.

Power off:

AUTOROTATE

A good example in which the "ABORT START" was used is as follows:

9-31. Auxiliary Power Unit (APU) Fire.

Normally an overtemperature condition will cause the overtemperature switch to stop APU operation. However, should a fire occur in the APU, complete the following:

1. APU switch—OFF.
2. ABORT START.

If you have experience in the UH-1 Iroquois and can remember when it was revised as an UPDATE manual, it was the first manual in which this concept was used. There is no doubt every user, pilot, instructor pilot (IP), standardization instructor pilot (SIP), and flight engineer (FE) probably will have to spend a few days and nights studying this new chapter and memorizing the procedures.

RADIOS/SPECIAL EQUIPMENT

The remaining changes in the operator's manual are not as dramatic as the changes in chapter 9. Chapters 1 through 4 deal with the following: requests for changing verbiage in the text; checking technical accuracy or minor description changes on the systems use; and standardization differences among the different -10s on systems that have the same pieces of equipment installed on them. Some of these corrections were made before this publication in previous changes, but some are still ongoing.

AVSCOM has a separate initiative going on to review all operator's manuals. This review will determine what radio and special mission equipment information is missing or incomplete, and what information lacks standardization among the different manuals; i.e., AN/ARC-164 HAVE QUICK, AN/ARC-201 SINGARS, AN/APX-100 Transponder, AN/APR-39 Radar Detecting Set. In many cases, the required information is missing and lacks standardization on the proper use of equipment, or the information is incomplete. AVSCOM is planning a conference in 1992 to discuss this information (Chapter 3 and Chapter 4) on the -10s. If you have any recommendations on improving this part of your manual, you should submit them on a Department of the Army (DA) Form 2028 to AVSCOM's address in the front of the operator's manual.

FIGURE REPLACED

Chapters 5 through 7 included some changes that are based on user desires and AVSCOM, U.S. Army Training and Doctrine Command (TRADOC), and DES requests.

One of the user requests was to put the old figure 5-2, Operational PTIT Limits, T55-L-712, back in chapter 5. Many pilots stated this figure was too complicated to understand; therefore, it was taken out some years ago. Now it is being put back in the manual because it helps explain the operating time limits better than the gauge in figure 5-1. Pilots will need to contact their respective IPs and SIPs for a training session on the explanation of the figure if there is doubt as to its use or meaning.

COLOR

Another change AVSCOM has instituted in the revision of all operator's manuals is the deletion of color. This change saves printing and production costs when revising these manuals. Consequently, your new manual will not have any color on the Instrument Gauges in chapter 5, on the Center of Gravity Limits Charts in chapter 6, or on the Performance Charts in chapter 7.

REQUIRED EQUIPMENT

Three areas in chapter 5 were affected. These areas concern limitations on required equipment for certain Army missions. However, these limits were not placed on the aircraft by the manufacturer to fly the aircraft. These limitations were deleted from the operator's manual and placed in Army Regulation (AR) 95-1, Table 5-2, Required Equipment Matrix.

The first part affected is Section VII, Environmental Restrictions. Information in paragraph 5-30 that discussed the use and operation of the advanced flight control system, two vertical gyros, and two vertical gyro indicators required during flight in instrument meteorological conditions was deleted from chapter 5 and placed in AR 95-1, table 5-2.

The information on night operations on water, Section VIII, Water Operation Limitations, paragraph 5-35, was deleted and integrated in AR 95-1, table 5-2. The last use of certain mission equipment concerned Section IX, Additional Limitations, paragraph 5-46, Night Vision Goggles (NVG). The requirement to have an operational, NVG-compatible, AN/APN-209 radar altimeter installed and functioning properly during terrain flight at night was deleted from chapter 5 and placed in AR 95-1, table 5-2.

As stated, these limitations were not placed on the aircraft by the manufacturer. They were placed by the Army to perform a certain mission, under certain conditions. They should not have been placed in the operator's manual as limitations on the aircraft.

SPECIAL NOTE: DES anticipates the Department of the Army will approve the printing of a revised AR

95-1, which will contain the revised table 5-2, during the 3d Quarter of 1992.

RESTRAINT DEVICES

Information in chapter 6 was deleted that covered restraint devices, tiedown procedures, and figures that also were covered in the capstone manual, Field Manual 55-405-2, Army Helicopter Internal Load Operations. This guidance comes from AR 34-4, Army Standardization Policy, whereby TRADOC is to "...insure that publications do not duplicate each other."

FLIGHT ENGINEER SYMBOL

The school has attempted to integrate nonrated crewmembers into the different mission aircraft and identify their specific duties and functions. In the CH-47D Operator's Manual, a new symbol has been developed for chapters 8 and 9 to do that function. The symbol "F" has been placed at the beginning of each procedural step in the checklist during the preflight, runup, and shutdown checks that must be performed by the flight engineer. Chapter 9 also has this symbol before the different emergency/malfunction steps that the crew may have to initiate. An example of the use of this symbol in an emergency procedure is as follows:

9-32. Engine or Fuselage Fire--Flight.

1. Land as soon as possible.

F 2. Engine fire confirm.

3. EMER ENG SHUTDOWN (affected engine).

After landing:

EMER ENG SHUTDOWN

APPENDIX C

During 1991, an issue was raised about required writeups the crew should make on DA Form 2408-13, if a certain condition was met before, during, or after a flight. These required writeups could be found anywhere from chapter 1 to chapter 9 in the operator's manual. After a discussion on the issue, a request was submitted to AVSCOM to approve putting all writeups in one location in the operator's manual and delete them throughout the manual. AVSCOM approved the request at the CH-47D Operator's Manual review held in St. Louis, MO, during 30 September through 4 October 1991. AVSCOM decided to put all required writeups that the crew may need to make in Appendix C, Conditional Inspections. This change will enable the crew to determine quickly if a writeup is necessary. All they will have to do is look at appendix C to see if an entry is required on the DA 2408-13.

DES hopes this article will help users of the CH-47D Operator's Manual and -CL to understand the reasons for these changes. For further information concerning the changes to the CH-47D Operator's Manual and -CL, please contact Mr. Stephen M. Harris, DSN 558-6066 or commercial 205-255-6066.

Mr. Harris is assigned to the Literature Review Branch, Directorate of Evaluation and Standardization, U.S. Army Aviation Center, Fort Rucker, AL.

TEAC By The Book

by
Major James Fitzpatrick
Chief Warrant Officer (CW4) Peter Dorpema
CW4 James Jegel
CW3 William Shumate

The Turbine Engine Analysis Check (TEAC) is the maintenance test flight (MTF) task that causes the most confusion for UH-1 Iroquois and AH-1 Cobra maintenance test pilots (MPs) and maintenance test flight evaluators (MEs). Some of the UH-1 and AH-1 MEs assigned to the Maintenance Test Flight Standardization Division, Directorate of Evaluation and Standardization (DOES), Fort Eustis, VA, feel that this confusion can be traced to two common causes.

First, many MPs have not taken the time to analyze the basic theory of TEAC. Second, many MPs do not follow the instructions concerning TEAC completion and computation given in Technical Manual (TM) 55-2840-229-23-1, Department of the Army Pamphlet (DA Pam) 738-751, the UH-1 and AH-1 MTFs, and Field Manual (FM) 1-544. This article clarifies the theory of the TEAC and addresses the specifics of how to complete the TEAC.

The T53-L-13B turbine engine is designed to produce 1,400 shaft horsepower (shp) on a standard day at sea level; the T53-L-703 is designed to produce 1,485 shp. The TEAC was developed to allow units in the field to verify this performance with the engine installed in the aircraft, thereby eliminating the requirement to use an engine test stand.

The topping portion of the TEAC is a flight maneuver that determines the maximum engine power output (torque) when maximum fuel flow is demanded from the fuel control. Remember, topping is only one of 11 steps required to complete a baseline TEAC.

When a test stand is used to verify that a specific T53-L-13B engine is capable of producing 1,400 shp, the following general procedure is used: The engine is placed in a test stand and connected to a waterbrake. Under standard-day (15 degrees celsius [C]), sea-level conditions, the engine is operated under increasing power loads until the waterbrake records 1,125 foot-pounds of actual output shaft torque, without exceeding gas-turbine speed (N1) or exhaust gas temperature (EGT) limits. The torque indicated in the test stand is recorded and becomes the data plate torque (DPT) for that specific engine.

On a standard day at sea level, this specific engine will produce at least 1,400 shp (1,125 foot-pounds torque measured at the output shaft), and the engine torque measuring system will indicate DPT. All DPTs must fall within the range of 61 pounds plus or minus (±) 3 pounds (58 to 64 foot-pounds).

The UH-1 powertrain is incapable of absorbing and using 1,400 shp. In other words, the UH-1 is airframe limited to some amount of horsepower less than 1,400 shp. Under standard-day, sea-level conditions, the UH-1 is limited to about 1,135 shp or 50 pounds of calibrated torque. Using the DPTs of 58 pounds to 64 pounds (61 ± 3), engineering analysis has determined that the 50 pounds of calibrated torque can be converted to a maximum allowable indicated torque by subtracting a specific constant from each DPT.

The constant is 11 pounds for all DPTs up to 63 pounds. For DPTs between 63 and 64 pounds, the constant is 11.5. For a DPT of 64 pounds the constant is 12. This adjusted torque becomes the torque red line for a specific engine in a specific aircraft. For example, if the DPT on the engine installed in UH-1 72-15123 is 58.5, the red line on the torquemeter gauge in the cockpit must be set at 47.5 pounds. Under standard-day conditions, when increasing power in that aircraft until the cockpit gauge reads 47.5 indicated torque, the pilot is at the airframe horsepower limit. Extra power is available; however, the use of this power may damage the drive train (overtorque).

How can we routinely determine if 1,400 shp is available from our T-53-L-13B engine, if use of this amount of horsepower may damage the aircraft? The answer is TEAC.

Checks Before Topping

TM 55-2840-229-23-1, paragraph 1-117, lists nine checks that are to be completed before performing the top-

ping portion of the TEAC. These checks are indicating system checks to ensure you have accurate information when recording engine data during the topping check. In addition, these checks are performed to help maintenance personnel identify a problem before flying the aircraft. With the exception of the torquemeter system, these checks are straight forward and self-explanatory. The torquemeter system check, however, is often being performed incorrectly throughout the Army.

Most units in the Army are performing this check by simply connecting the MP1 tester to the transmitters/transducers, pumping the tester up to the required value, and comparing MP1 tester indication against the cockpit indication. If the gauge in the cockpit is within the required tolerance, the units feel this is a complete check. Only the indicating system of the airframe is checked when you do the system accuracy procedure in this manner. It does nothing to check the engine portion of the torque indicating system.

The engine manual refers us to troubleshooting procedure Number 22. This procedure says nothing about testing the system with the MP1 tester. Troubleshooting procedure Number 22 requires two separate checks. First, as described in steps one through four, accessory drive gearbox pressure must be subtracted from torquemeter pressure, using two direct reading pressure gauges connected to the engine with "T" fittings in the accessory drive gearbox and torquemeter pressure lines that run to the torquemeter pressure transmitter. Second, torquemeter boost pump pressure at 92-percent N1 must be checked, with a direct reading pressure gauge, to ensure that the torquemeter boost pump is producing at least 120 pounds per square inch (psi) of oil pressure. When both portions of troubleshooting procedure Number 22 are satisfactorily completed, proper operation of the torquemeter system is assured.

Steps one through nine must be done before topping if a baseline TEAC is being performed. Normal TEACs require starting at step nine. For a normal TEAC all you are required to do is determine engine DPT, perform a topping check according to the appropriate MTF, and evaluate and record the data. Although technically not required, DOES recommends checking throttle rigging, bleed band closing point, and variable inlet guide vane (VIGV) begin to open point before conducting the topping check during a normal TEAC.

The UH-1 and AH-1 MTFs explain the conduct of the topping maneuvers for such aircraft. MPs must know and heed the cautions relating to exceeding engine limits, the possibility of exceeding velocity never exceeded (VNE), and the possibility of inducing compressor stalls with rapid collective reduction.

Recording and Evaluation of Topping Data

DA Pam 738-751, paragraph 3-15, outlines the proper procedure for recording topping data on the DA Form 2408-15 (Overprint). Some of the common problems associated with filling out this form are as follows:

- Entries are recorded by unauthorized personnel. DA Pam 738-751, paragraph 3-15c(3), requires the form to be filled out by the unit or activity maintenance officer or test pilot. The possibility of transposition or calculation errors increases when someone other than authorized personnel enters this information on the form.
- Entries are omitted or incorrect information is entered. DA Pam 738-751, figure 3-16, item 4 (Note), states: "Columns 5a through 5i are used to show actual and required engine performance data." This note means all columns must have an entry. *Example*: Actual N1 for a baseline TEAC for a T53-L-703 engine also becomes the required N1. This required N1 will never change until a new baseline is established. This value will be entered in the required column of each succeeding TEAC, unless you establish a new baseline. Another common entry error deals with what value goes in the outside air temperature (OAT) column. DA Pam 738-751, figure 3-16, item 5d, states: "**OAT.** Enter the actual outside air temperature (OAT). Do not enter compensated OAT."
- Interim and deferred checks are entered on the overprinted side of the form. TM 55-2840-229-23-1, pages 1-302 and 1-303, lets you perform these checks if you cannot top the engine because of ceiling limitations or ambient weather conditions. Neither of these checks is a completed topping check. Therefore, this information is entered on the reverse side of the DA Form 2408-15 (Overprint).

Evaluation of the data recorded during the topping portion of the TEAC is the most important aspect of the entire check. If the maintenance officer/test pilot does not know how to interpret the data, the TEAC has no value.

To properly understand the information you are working with, you must first distinguish between a baseline and a normal TEAC. TM 55-2840-229-23-1, paragraph 1-117, item 14, outlines the procedures for baseline computations. Item 15 outlines the procedures for a normal TEAC computation. It is imperative that you use the proper reference when computing these data.

T53-L-703 engine computations are simple because there is no adjustment factor for turbine gas temperature (TGT). This is not the case with the T53-L-13B engine. The most common error associated with baseline TEAC for the T53-L-13B engine is in the area of EGT computations. This information is clearly stated in the TM 55-2840-229-23-1 engine manual, but MPs often do not do a very good job of reading the manual.

EGT adjustments should be accomplished as stated in the following example: A baseline topping check is being performed on UH-1 72-15123. During this maneuver the engine is topped and the following instrument indications are noted at an altitude of 5,000 foot pressure altitude (PA): +24 degrees OAT, N1 99.5 percent, 45 psi torque (TQ), and a 580 EGT. DPT is 61.0. Required torque for this example is 42 psi, so torque is within parameters.

We now need to compute our baseline EGT. Using the EGT adjustment factor of TM 55-2840-229-23-1, paragraph 1-117, item 14, enter the chart at the nearest compensated OAT, which in this example is +25 degrees (+24 degrees +3 degrees compensation equals 27 degrees C. The nearest value on the chart is +25 degrees C).

Using the baseline TEAC column, we determine that the adjustment factor is -10 degrees. Subtract 10 degrees from the actual recorded value at 5,000 feet PA (580 degrees). This provides the required baseline EGT of 570 degrees. This value will be entered in the required block (5h) of the DA Form 2408-15 (Overprint).

Six months later aircraft 72-15123 is coming out of phase and due a normal TEAC. The engine is topped at an altitude of 6,000 foot PA; the following instrument indications are recorded: +18 degrees OAT, N1 99.6 percent, 45 psi TQ, and a 580 EGT. DPT is still 61.0. Required torque is 43.5 psi, so torque is again within parameters. The N1 is within the specified tolerance of ±1 percent. The next step is to compute the required EGT for this normal TEAC. Again using the EGT adjustment chart in TM 55-2840-229-23-1, paragraph 1-117, item 14, enter the chart at the nearest compensated OAT, which in this example is +20 degrees. .Using the normal TEAC column of the chart, EGT adjustment factor is +5 degrees. Add 5 degrees to the baseline EGT of 570 degrees. This results in a required normal EGT of 575 degrees. The actual EGT of 580 degrees must agree within ±20 degrees of the required EGT, in this example 575 degrees EGT.

The other computation that may be required deals with N1 speed. This computation applies to both the T53-L-13B and the T53-L-703 engines. TM 55-2840-229-23-1, paragraph 1-117, item 14, states: "for a Baseline TEAC if the compensated temperature at test altitude (OAT +3 degrees C) is +30 degrees C and above, or -20 degrees C and below, add 0.5 percent to the N1 speed recorded in flight." This then becomes your required (baseline) N1 percent and is recorded on the DA Form 2408-15 (Overprint) as such.

For a normal TEAC, if the compensated temperature at test altitude (OAT + 3 degrees C) is +30 degrees C and above, or -20 degrees C and below, subtract 0.5 percent from the baseline required N1 speed. This then becomes the required N1 percent for that normal TEAC and is recorded on the DA Form 2408-15 (Overprint) as such.

Interim and Deferred Topping Checks

Two procedures in TM 55-2840-229-23-1 allow units to use aircraft for normal mission training when it is impossible to complete the topping portion of the TEAC. These procedures are on pages 1-302 and 1-303 of TM 55-2840-229-23-1 and are explained as follows:

Interim check. When the weather precludes topping because of ceiling and visibility limitations, the aircraft may be released for normal mission flights until climatic conditions improve. To release the aircraft, you must be able to achieve maximum torque available without exceeding any engine limit. Maximum torque will be determined from the appropriate —10 operator's manual, based on existing or predicted pressure altitude and temperature for that flight period. In addition, the aircraft must produce this torque without any N2 bleed or exceeding any engine limit. Completion of this check will be recorded on the reverse side of the DA Form 2408-15 (Overprint) according to DA Pam 738-751 and TM 55-2840-229-23-1.

This procedure is not authority to defer TEAC completion; rather, it is an interim check pending TEAC completion. The TEAC required entry on the DA Form 2408-13 will remain

open until actual completion of the TEAC. The maintenance officer/test pilot will ensure that the completion of TEAC procedure is accomplished at the earliest possible date.

Deferred check. If ambient conditions at maximum topping altitude do not allow us to use the power chart because of low temperatures, we may defer the topping portion of the TEAC until the conditions become better suited for completion of the topping procedure. (Temperature is at least -15 degrees compensated at 10,000-foot PA for T53-L-13B or +5 degrees compensated for a T53-L-703 engine at 11,000-foot PA). The aircraft can be released for normal mission flights if the engine, as a minimum, produces required torque from the appropriate power chart in TM 55-2840-229-23-1, and no other limits are exceeded. The maintenance officer/test pilot will ensure that this deferral is not used as a means of deleting the topping requirement. Deferring the TEAC should be used as a maintenance management tool to minimize aircraft downtime that would otherwise result from unfavorable atmospheric conditions.

When a baseline TEAC is deferred, the test pilot must ensure a "temporary baseline hit" is established according to TM 55-2840-229-23-1, paragraph 1-116.

When To Do a Baseline Versus Normal TEAC

According to TM 55-2840-229-23-1, paragraph 1-117, a baseline is established when the engine is newly installed, overhauled, or when any maintenance is performed that affects fuel flow, air flow, or gas path. This baseline TEAC will establish the N1 speed and EGT/TGT indication at which the installed engine produces rated power. These indications will be the standard of performance for a particular engine installed in a particular aircraft.

DOES maintains the USAALS 24-hour hotline...

During visits to the field, DOES has noted that many MPs have completed a baseline TEAC when actually a normal TEAC is required. Anytime a baseline is established, prior historical data and its relationship to engine performance are lost. Consequently, any loss of engine performance will take longer to notice. Obviously, anytime the military trim screw or the idle trim is adjusted, a baseline TEAC must be performed. A common occurrence is to establish a baseline TEAC when a hot-end inspection has been completed. When a hot-end has been inspected and found to be serviceable, nothing has changed that requires the establishment of a new baseline TEAC. Completing a normal TEAC also may tell you if the hot-end went back together correctly. When parts have been changed or maintenance has been performed that does change gas path, a baseline TEAC is appropriate.

When instruments have been changed, such as the free-air temperature (FAT), N1, or torque gauge, there is no reason to establish a new baseline. A normal TEAC can be performed; however, it is not required. Performing maintenance on the EGT indicating system does not change the engine performance parameters. Replacing the gauge or adjusting the resistance to the proper settings only resets the indicating system to acceptable limits.

A normal TEAC shall be performed whenever installed engine performance degradation is suspected or as part of a general test flight. A normal TEAC cannot be performed if baseline TEAC data are not available. Normal TEAC data are compared to the baseline data, and the troubleshooting chart in TM 55-2840-229-23-1, paragraph 1-117, item 20, is used to lead you to the problem area or the specific problem. Over a period of time, comparing normal TEAC data with the baseline TEAC data shows the trend in engine performance.

Checking the performance and trends of T53-L-13B and T53-L-703 engines is not as complicated as most maintenance officers make it. The essential rule is to follow the guidance published in TM 55-2840-229-23 and the UH-1 and AH-1 MTFs. Performing maintenance by the book is the mark of an aviation maintenance professional. Let's be professional when it comes to TEAC.

USAALS Hotline

Any questions relating to maintenance test flight procedures or MP standardization issues should be directed to the Maintenance Test Flight Standardization Division, DOES, DSN 927-3266. The DOES maintains the USAALS 24-hour hotline for questions after normal duty hours. To use the hotline, call DSN 927-6166 (commercial 804-878-6166) and leave a message. The DOES will return your call the following duty day.

Major Fitzpatrick, CW4 Dorpema, CW4 Jegel, and CW3 Shumate are assigned to the Directorate of Evaluation and Standardization, U.S. Army Aviation Logistics School, Fort Eustis, VA.

Aviation Drawdown

There are tons of messages and the electronic mail screens are full of information on the downsizing of the Army. How will this affect Army Aviation? This article focuses on some of the military occupational specialties (MOSs) within Army Aviation. The Army plans to drawdown by using six programs to reduce enlisted strength—reduced accessions, voluntary early transition program, enhanced quality standards, excellence in retention program, voluntary separation options, and Command Sergeant Major/Sergeant Major Selection Early Release Board. These six programs are designed to keep the quality soldier in the Army and provide viable career paths with promotion opportunity.

We have determined how many authorizations will be reduced between January 1992 and January 1996 for some selected Army Aviation MOSs. The figures are not exact and circumstances can change, but these are the figures the Aviation Proponency Office uses for planning.

Career Management Field (CMF) 67 will drawdown from about 18,035 soldiers to about 15,300 soldiers by January 1996, which is a loss of about 2,735 spaces. CMF 93 will drawdown from about 4,142 soldiers to about 3,481 soldiers by January 1996, which is a loss of about 661 spaces. The total Army Aviation enlisted reduction will be about 3,396 spaces between now and January 1996. This is a reduction of 15.3 percent, which is much less than some of the other branches.

Here is a snapshot of how some Aviation MOS authorizations will be affected by the drawdown.

93C Air Traffic Control

Jan	PFC	SPC	SGT	SSG	SFC	MSG	SGM	Total
1992	330	500	189	369	221	66	4	1679
1996	279	434	172	323	200	62	4	1474
Total	-51	-66	-17	-46	-21	-4	0	-205

93P Aviation Operations

Jan	PFC	SPC	SGT	SSG	SFC	MSG	SGM	Total
1992	389	470	201	174	241	109	37	1621
1996	317	410	185	147	201	100	30	1390
Total	-72	-60	-16	-27	-40	-9	-7	-231

67N UH-1 Iroquois Repairer

Jan	PFC	SPC	SGT	SSG	Total
1992	427	553	476	371	1827
1996	283	360	339	270	1252
Total	-144	-193	-137	-101	-575

67R AH-64 Apache Repairer

Jan	PFC	SPC	SGT	SSG	SFC	Total
1992	281	361	190	227	200	1259
1996	273	448	222	214	255	1412
Total	-8	+87	+32	-13	+55	+153

67T UH-60 Black Hawk Repairer

Jan	PFC	SPC	SGT	SSG	SFC	Total
1992	611	587	585	504	483	2770
1996	577	620	537	461	404	2599
Total	-34	+33	-48	-43	-79	-171

67Z Senior Aviation Maintenance

Jan	MSG	SGM	Total
1992	568	30	598
1996	493	29	522
Total	-75	-1	-76

68F Aircraft Electrician

Jan	PFC	SPC	SGT	SSG	Total
1992	118	215	158	68	559
1996	121	180	143	57	501
Total	+3	-35	-15	-11	-58

68N Avionic Mechanic

Jan	PFC	SPC	SGT	SSG	Total
1992	202	198	194	201	795
1996	158	193	176	166	693
Total	-44	-5	-18	-35	-102

68P Avionic Maintenance Supervisor

Jan	SFC
1992	136
1996	94
Total	-42

Although these numbers are not exact, they do reflect the downsizing and its impact on Army Aviation. The 67N's large decrease is due to the reduction in airframes. The 67R's increase is due to the increase in airframes. The drawdown is affecting all MOSs and grades. It is important to keep an effective mixture of rank and reduce all skill levels proportionately.

Aviation Proponency Office

Readers may address matters concerning aviation personnel notes to: Chief, Aviation Proponency Office, ATTN: ATZQ-AP, Fort Rucker, AL 36362-5000; or call DSN 558-5706/2359 or commercial 205-5706/2359.

Improving FLIP

by Mr. Richard T. Johnson

The Flight Information Publication (FLIP) just happens, right? It is always there for the aviator's use, but does it just happen? No, FLIP is the result of a combination of extensive coordinated effort, knowledge, and identification of Department of Defense (DOD) aviator requirements.

FLIP is a DOD product used primarily by U.S. military aviation, and it is relied upon, to a substantial extent, by many of our allies around the world. It is essential for safe, legitimate, and well-planned flight in a peacetime environment. As a result, its accuracy and usefulness must meet aviation requirements. FLIP is challenged, reviewed, and corrected daily by everyone coming in contact with the product.

FLIP has many flight information products. Correcting the data contained in FLIP is a continuous effort, and the systems currently in use by the various services are successful. This article does not address corrections to information already contained in FLIP. It focuses on how FLIP is changed in terms of format, types of publications required, and content required. In other words, it tells how FLIP can be made better?

Everything about FLIP is considered and determined by a tri-Service forum consisting of members from the Army, Air Force, and Navy, with representatives of the Defense Mapping Agency, Fort Belvoir, VA, and U.S. Naval Observatory, Washington, DC, acting as advisors. The group is known formally as the FLIP coordinating committee (FCC). All validated service requirements, recommended improvements, and charting solutions are referred to the FCC for action. Approximately 90 percent of the recommendations provided to the FCC are user generated. That is an extremely important element of the FLIP program. The "user" is what FLIP is really all about.

What channels are available to the aircrew member, base operations dispatcher, or air traffic controller to submit his or her questions, comments, and recommendations? Direct access to the U.S. Army Aeronautical Services Agency (USAASA) is available (and strongly encouraged) by communication (COMM) Card, telephone, message, letter, or an office visit. Army Regulation (AR) 95-2 identifies the major offices involved with the aeronautical information program and provides detailed instructions concerning COMM card submissions.

If you are overseas, another highly useful and, perhaps, more convenient channel available is through your Theater FLIP Maintenance Working Group (TFMWG). The TFMWGs were established 6 years ago to review all FLIP for specific areas of operation. TFMWG reviews are held in each theater, semiannually, and concern product format and utility. The TFMWGs also develop recommendations to improve the currency and standardization of FLIP. They rely heavily on data and expertise provided by Army, Air Force, and Navy Aviation personnel in their respective theaters. Findings are reported directly to the FCC. Army points of contact in the various areas of the world are as follows:

CONUS (including Alaska) and Other Theaters in the World

Director, USAASA, ATTN: MOAS-AI, Cameron Station, Alexandria, VA 22304-5050. Telephone commercial 703-274-7773/74 or DSN 284-7773/74. (Mr. Walt Perron, Army member -FCC)

Europe, Africa, Middle East, and Southwest Asia

Commander, USAASDE, Unit 29243, APO AE 09102-3162. Telephone ETS/DSN 370-8079. (Mr. John Sharer, Army member - TFMWG Europe)

PACIFIC

Korea. Commander, Eighth U.S. Army, ATTN: EACJ-EA-ATC, APO AP 96205-0009. Telephone DSN 723-6115.

Hawaii. Commander, U.S. Army Pacific, ATTN: APOP-TRA, Fort Shafter, HI 96858-5100. Telephone DSN 438-1078. (Army member - TFMWG Pacific)

Note: Addresses listed for USAASA (formerly USAASO) and ATC in Korea supersede those listed in AR 95-2.

Caribbean, Central and South America

Panama. Commander, U.S. Army South, Unit 7107, ATTN: SOAR-AV, APO AA 34004-5000. Telephone DSN 287-5003/5952/6867. (Army member - TFMWG Caribbean and South America)

Remember, your input is essential. That cannot be overemphasized. Make the FLIP serve you!

Mr. Johnson is assigned to U.S. Army Aeronautical Services Agency, Cameron Station, Alexandria, VA.

U.S. Army Aeronautical Services Agency

USAASA invites your questions and comments and may be contacted at DSN 284-7773/7984 or write to: Commander, U.S. Army Aeronautical Services Agency, ATTN: MOAS-AI, Cameron Station, Alexandria, VA 22304-5050.

PEARL'S

Proper Food Preparation

Cooking food, at home and in the survival environment, is a popular method of making food more enjoyable. Some foods taste better, are digested easier, and make us feel good when cooked. In any situation, cooking is also the best way to kill parasites.

Airforce Regulation 64-4 states, "all wild game, large insects (grasshoppers), freshwater fish, clams, mussels, snails, and crawfish must be thoroughly cooked to kill internal parasites." In a combat situation, cooking might not be feasible. In such a case, food may have to be ingested uncooked. However, in a training situation, there is no reason to ingest uncooked food that could carry parasites.

Overcoming food aversions is critical for survival, but you do not have to take chances. Take, for example, slugs found near rivers. Sure, survival students can learn to overcome food aversions by eating uncooked slugs. However, most people would agree any nontraditional food, cooked or uncooked, can be challenging. When training a student to overcome food aversion, forcing him or her to ingest nontraditional food could produce traumatic results, further hindering the training goal. Parasitic infections may result in distractions, illnesses, or absences that affect learning.

By teaching potential survivors how to cook food and that cooking will make the food more enjoyable, we help them overcome the aversion. After all, isn't that our objective?

Hypothermia

Most people think of hypothermia as a severe cold weather condition and too often overlook it when the temperature begins to rise. Little do they know the ideal conditions for a person to fall victim to hypothermia are windy and wet weather with the temperature between 30 and 50 degrees Fahrenheit.

Hypothermia begins when a person's inner body core temperature falls below his or her normal body temperature. As the body core temperature falls, the symptoms begin and become progressively severe.

At first, mild shivering beings as the body tries to reheat itself. Then, intense shivering results in a reduced ability to perform even the simplest tasks. When the core temperature falls even further, violent shivering nearly shuts down all speaking and thinking functions. Eventually, shivering is replaced by muscular rigidity and a loss of contact with the environment. Next, the victim will drift into a stupor and then unconsciousness. Finally, heart failure and cessation of brain control lead to death.

The time to prevent hypothermia is during the period of exposure and exhaustion. The moment the body begins to lose heat faster than it produces it, you become hypothermic. Exercising to stay warm or involuntary adjustment made by the body to preserve the normal temperature of vital organs causes the exhaustion. These actions drain your energy reserve.

By following a few simple rules, hypothermia can be avoided. First, stay dry. Wet clothes lose about 90 percent of their insulating value. Also, beware of the wind. Wind drives cold air under and through clothing, removing much of the warm air. Wind mixed with wet clothing refrigerates the body by removing moisture. When moisture is removed, it takes heat with it. Finally, understand the cold. Many people underestimate the danger of being wet at moderate to cool temperatures.

Remember, hypothermia can happen anytime of the year. No matter where you go or what you do, take enough clothing to protect you from all types of weather.

Air Bathing

Like the old saying goes, "Cleanliness is next to godliness." In a survival situation, cleanliness is essential to prevent infection. But what do you do when water is in short supply? Simple, take an "air bath."

To air bathe, just remove your clothing and expose your body to the air. Exposure to sunshine is ideal, but even on overcast days, a 2-hour exposure of your skin to the air will refresh your body. Care should be taken to avoid sunburn and cold injuries when those conditions exist. Exposure in the shade, shelter, and sleeping bag will help if weather conditions do not permit direct exposure.

Adequate personal cleanliness will not only help protect you against germs present in your personal surroundings, it will also help protect others in your group by reducing the spread of germs. The persons in your group might appreciate you a little more, too.

Personal Equipment and Rescue/ survival Lowdown

If you have questions about ALSE or rescue/survival gear, write to AMC Product Management Office, ATTN: AMCPM-ALSE, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798, or call DSN 693-3573 or commercial 314-263-3573.

Dustoff Black Hawk—The UH-60Q

by Lieutenant Colonel R. (Huey) Huether

The article, "Air Ambulance Of The Future," September/October 1991 issue of the *U.S. Army Aviation Digest*, announced the addition of the UH-60Q to the UH-60A Black Hawk family. This article explains why the UH-60Q is needed and why the UH-60A did not make a satisfactory air ambulance.

Though the UH-60A makes a great troop carrier, it has some sizable shortcomings when used as an air ambulance. These shortcomings are addressed in the UH-60Q and solutions planned.

Heating and Cooling System

There is no heat in the patient area of a UH-60A air ambulance. A patient in critical condition and in shock has a difficult time maintaining body temperature (both warmth and cooling). If the patient is not completely or warmly dressed or needs to be examined, the lack of heat in the patient compartment will be a serious deficiency. During the summer months, it is difficult to keep patients cool since flying with the cargo doors open reeks havoc with intravenous tubes, dressings, and bandages. The UH-60Q is being programmed to include an environmental control unit that will provide supplementary heat and cooling in the patient compartment.

Internal Rescue Hoist

The internal rescue hoist used on the UH-60A was designed for use on the UH-1 Iroquois. The internal rescue hoist takes up so much room that only half the litter capacity may be used during rescue hoist missions. One solution is to have a rescue hoist-equipped air ambulance and a litter-equipped air ambulance. However, this solution is unacceptable. To save lives efficiently, air ambulances must be capable of accepting any mission (or series of missions) at any time. The UH-60Q, when outfitted with an externally mounted rescue hoist, will be ready to accept rescue hoist missions at any time and maintain full internal litter capacity.

Oxygen-Generating System

A time-limited supply of bottled, medical oxygen has always been a problem on UH-60A air ambulances. The oxygen bottles take up valuable patient compartment space, present a considerable safety hazard, and are a logistical nightmare to resupply during combat operations. The UH-60Q will take advantage of molecular sieve technology to concentrate the oxygen in ambient air and produce medical oxygen. This means that the UH-60Q will have a continuous and unlimited supply of medical oxygen.

Litter System

The litter system in UH-60A air ambulances had to be an aircraft kit, use existing fittings, and required no modification of the aircraft. These requirements severely limited the litter loading system design options, resulting in compromised capacity and patient care space. The UH-60Q litter system allows more room for attending patients and increases ambulatory patient carrying capacity. This system increased the ambulatory patient carrying capacity from one ambulatory on the UH-60A to three ambulatory on the UH-60Q.

Conclusion

The "Q" is a series designator. However, it could symbolize the "Quantum" improvement that this aircraft will make to wounded soldiers and to the aeromedical evacuation system.

LTC Huether is assigned to the Directorate of Combat and Doctrine Development, U.S. Army Medical Department School and Center, Fort Sam Houston, TX.

Office of the Aviation Medicine Consultant

The Aviation Medicine Report is a bimonthly report from the Aviation Medicine Consultant of TSG. Please forward subject matter of current aeromedical importance for editorial consideration to U.S. Aeromedical Center, ATTN: HSXY-ADJ, Fort Rucker, AL 36362-5333

Army Oil Analysis Program in Wartime

by Mr. Richard A. Cardinale
and
Mr. John S. Glaeser

Operation Desert Storm—Lessons Learned

The Army Oil Analysis Program (AOAP) is an integral part of the maintenance plan for weapons systems. It contributes significantly in providing safety to flight crews and readiness to the commander in times of peace or war.

During the transition from a peacetime to a wartime role for Operation Desert Storm (ODS), many key AOAP issues surfaced as lessons learned. These lessons learned are best understood by describing both peacetime and wartime oil analysis support procedures.

Peacetime AOAP

In peacetime, civilians (government and contractor) operate fixed-based AOAP laboratories. Military staffing is required only on mobilization or deployment to remote areas or theater of operations (TO).

Wartime AOAP

Current fixed-based AOAP laboratories cannot provide timely support to the oil analysis effort in new, undeveloped TOs. There are two mobile laboratories available for deployment during a wartime situation. However, there was no table of organization and equipment or table of distribution and allowances, for the ODS area, authorizing people and equipment. In addition, there was no established organizational structure for providing command and control and support of an AOAP laboratory operation in ODS.

Mobile Laboratory Deployment

The U.S. Army Aviation Systems Command (AVSCOM) and the AOAP Program Director, Materiel Readiness Support Activity, Lexington, KY, agreed that the first mobile AOAP laboratory should be airlifted with a laboratory crew and the supporting power generator. However, the mobile laboratory was dispatched to the TO using a surface ship. The ship incurred an underway breakdown and went into port for repairs, thus delaying in-country AOAP support.

Fixed-Base Laboratories

Fixed-base laboratories are provided with trained evaluators and technicians. The availability of AOAP-trained, military personnel was inadequate for the ODS. Ten military personnel were identified for training, and their training was completed at Mobile Laboratory Number One, Fort Campbell, KY. After their deployment, the one remaining AOAP-certified, military person went on emergency leave.

Consequently, the AOAP Program Director's office had to deploy civilian technical representatives on temporary duty basis to Southwest Asia to help perform the AOAP mission. Construction of Mobile Laboratory Number Two was completed shortly thereafter. The AOAP civilian technicians remained and served as evaluators with Mobile Laboratory Number Two until other more permanent contractor-support personnel took over. This was imperative since AOAP-trained military personnel still were not available to staff this new mobile laboratory.

A Dilemma

The Army is faced with the dilemma of having a proven oil analysis program that is not readily deployable in an emergency. This dilemma is the result of the lack of a defined organizational structure and AOAP-qualified military personnel. Mobile AOAP laboratories staffed by qualified military technicians are the best method to ensure the availability of AOAP support in a mature TO.

The Fundamental Lesson

The underlying lesson learned from ODS was that there is a lack of concepts and doctrine for the peacetime AOAP program to transition to wartime. The AOAP wartime role is being developed through the Army Maintenance Master Plan process according to the AirLand Battle Scenario. In addition, AVSCOM will establish an AOAP process action team to study and validate Army aeronautical requirements for oil analysis support.

Mr. Cardinale and Mr. Glaeser are assigned to the Depot Engineering and RCM Support Division, Corpus Christi Army Depot, TX.

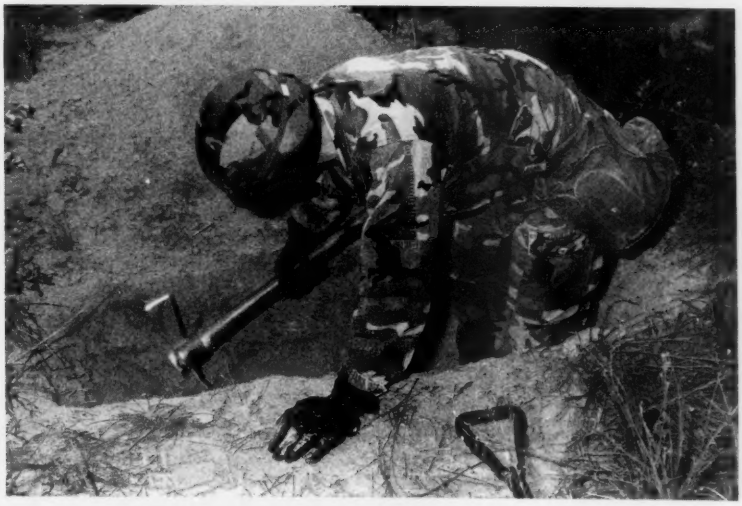
U.S. Army Aviation Systems Command

Readers may address maintenance questions to: Directorate for Maintenance, ATTN: AMSAV-MPED, 4300 Goodfellow Blvd, St. Louis, MO 63120-1798; or call DSN 693-2532 or commercial 314-263-2532

TEXCOM

MATTAX

by Mr. John L. Brady



Fort Benning soldier participates in test on MATTAX.

While the U.S. Army Test and Experimentation Command (TEXCOM), Fort Hood, TX, is involved in many high-visibility tests, the individual soldier is not forgotten. TEXCOM testers have and will continue to be involved with testing a variety of clothing and equipment for the individual soldier.

From new gas masks to both hot weather and cold weather boots, TEXCOM uses soldiers in the field to find out what works and what does not—the truth.

Recently, the TEXCOM Armor Test Directorate tested two candidates for a new mattock/axe, called a MATTAX. Some 36 soldiers at Fort Benning, GA, performed normal infantry tasks with the new candidates designed to augment the current issue entrenching shovel. Data were collected on the improvements the MATTAX added and human factors data from carrying it on road marches; negotiating obstacles; and entering or exiting vehicles and aircraft.

The data collected were provided to the U.S. Army Infantry School, Fort Benning, GA, and Natick Research, Development and Engineering Center, Natick, MA. These data were combined with other information that will form the basis of decisions concerning further development and procurement. TEXCOM has one ultimate customer—the soldier!

Mr. Brady is a Test Documentation Photographer, who is assigned to TEXCOM, Fort Hood, TX.

Test and Experimentation Command

Readers may address matters concerning test and experimentation to: Headquarters, TEXCOM, ATTN: CSTE-TCS-PAO, Fort Hood, TX 76544-5065

U.S. Army Class A Aviation Flight Mishaps

Fiscal Year	Number	Flying Hours	Rate	Army Fatalities	Total Cost (in millions)
FY 91 (through 28 February)	30	550,560	5.45	23	$108.8
FY 92 (through 29 February)	9	516,867 (estimated)	1.74	4	$ 32.5

ATC Maintenance AMF To AMSF

by Mr. Jack Zornes

The Area Maintenance Facility (AMF) was formed 1 September 1975, under the U.S. Army Communications Command (USACC). The USACC later became the U.S. Army Information Systems Command. The AMF was a branch of the Air Traffic Control/Navigational Aids (ATC/NAVAIDs) Maintenance Division. Its mission was to provide technical and direct exchange (DX) support throughout the 7th Signal Command area (Continental United States [CONUS] [including Alaska and Hawaii], Panama, and Korea) on nontactical NAVAIDs.

Technical support consisted of a mobile maintenance contact team that provided onsite assistance to correct any problem that was beyond the local maintenance personnel capability. There also was an open line to the team for any problem that could be resolved by telephone. Telephone service was free to the requester, with equal access to all ATC activities.

The DX service was an accelerated supply transaction in which a serviceable item was exchanged for a similar unserviceable item on a one-for-one basis. If practical, the unserviceable item was repaired and stocked for reissue to another unit. This function reduced downtime of equipment and cost of modules for repair. The DX, when formed in 1975, contained approximately 100 items available for the following ATC/NAVAID systems: new family radios (AN/GRR/GRT 20 series), AN/FPN-40 ground-controlled approach radars, AN/URN-5 nondirectional beacon, AN/FSW-8 communications console, and the Dictaphone 4000 recording system.

Over the years, new equipment has been added through upgrading facilities or systems, thus expanding the DX to 300 plus items. During 1975 through 1987, the 7th Signal Command, Fort Ritchie, MD, operated a Consolidated Supply Support to supply ATC-peculiar parts to all CONUS activities.

The ATC-transfer plan was implemented on 1 October 1986, thus moving the U.S. Army Air Traffic Control Activity to Fort Rucker, AL. The decentralization of ATC from one major Army command (MACOM) created several problems—

- No future standardization of equipment; unless directed by the Department of the Army (DA), which would allow each MACOM to purchase whatever budgeting would permit.
- No central supply support; each ATC facility would order from the wholesale-supply system, increasing downtime of equipment.
- Intermediate-level-maintenance support probably would change because of the various MACOM regulations and policies. The supply support shortfall was solved temporarily because of the concurrence of the 7th Signal Command to continue it for 1 year (later extended an additional 6 months).

In August 1988, Headquarters DA revised the ATC-transfer plan, establishing an Area Maintenance and Supply Facility (AMSF) at Fort Rucker. With message in hand, a proposed authorized stockage list of 600 plus items was compiled, concentrating on low-density and antiquated systems still in use. This will provide intense management of ATC-peculiar repair parts and preclude degradation of the ATC-NAVAIDs maintenance effort. However, because of the impending supply conversion of parts from procurement appropriation-funded to stock-funded, some areas of finance may require change in the future. These issues are being resolved and ATC maintenance will continue to be responsive and efficient.

As in the past, we at AMSF are committed to deliver supplies and services to whomever or wherever the need arises. We were designed initially to be a responsive, quick-fix team, striving to reduce equipment downtime and make Army Aviation as safe as possible. The AMSF is fortunate to have the caliber of technicians it has and is ready, willing, and able to make this expertise available to you. We remain at your service.

Mr. Zornes is assigned to the U.S. Army Air Traffic Control Activity, Fort Rucker, AL.

U.S. Army Air Traffic Control Activity

Readers are encouraged to address matters concerning air traffic control to: Commander, USAAVNC, ATZQ-ATC-MO, Fort Rucker, AL 36362-5265

Arming The AH-1S Cobra

by Command Sergeant Major Jack H. List

The Western Army National Guard Aviation Training Site (AATS) is located at the Silver Bell Army Heliport, Marana, AZ. The Western AATS is the premier Army National Guard (ARNG) Training Site for attack and scout helicopter pilots conducting National Guard Bureau-directed training. Attack helicopter, aerial gunnery, and aeroscout training, which is not within a State's or unit's capability or authority to perform, is conducted for ARNG instructor pilots, aviators, and enlisted personnel.

Besides training aviators in AH-1 and OH-58 Kiowa aircraft, the AATS also offers an AH-1S Armament/Range Operations Course. The course is designed to train ARNG soldiers with 67- and 68-series military occupational specialties (MOSs), selected 55B aviation noncommissioned officers (NCOs), junior officers, and warrant officers at the company and battalion/squadron levels who are responsible for range operations. The course has academic and hands-on training in range safety, ammunition handling, and arming the four weapons systems on the AH-1S. The course supports the AH-1S aviator qualification course by including training on arming the AH-1Ss with live ammunition. The course, which teaches the student to arm and troubleshoot various systems, prepares them to go downrange and attack targets on the Barry M. Goldwater Aerial Gunnery Range.

The following is a list of subjects the students are exposed to during the 2-week course, which is designed to transition the student from the UH-1M Iroquois model weapons system to the AH-1: Safety; Helmet Sight Subsystems; M28A2 Turret Weapons System; M73/2.75-inch folding fin aerial/aircraft rocket; M65 TOW System; Ammunition Requisition and Vehicle Inspection; Ammunition Draw; Ammunition Breakdown and Aircraft Arming Pad Preparation; Prearming checks, Aircraft Army Procedures; Postfiring Troubleshooting; and Aircraft Weapons Disarming and Safety.

The course is unique because it allows an ARNG unit to send its aviators to the Aircraft Qualification Course and its NCOs to the Armament Course. After completion of the courses, both aviator and NCO can go back to their units and be confident that, whether they go to war or to the range, they will have the necessary skills to do the mission. In the future, the course also will include the weapons systems of the AH-1F aircraft. The training for fiscal year 1992 has 12 2-week range periods.

The Western AATS offers two additional courses for NCOs—the 67Y Familiarization Course and the Aviation Mishap Prevention Orientation Course (AMPOC). The 67Y Familiarization Course is a 2-week course designed to teach a 67-series MOS soldier about AH-1S peculiarities. The course is designed with 90-percent hands-on training and 10-percent classroom instruction. The AMPOC is a 5-day course that includes academic instruction on the ARNG Safety Program; aircraft maintenance accident prevention; petroleum, oil, and lubricants human factors; and other aviation safety-related issues.

Information on course dates and prerequisites are in the AATS Course Catalog that is available at each State Army Aviation Office. The information also may be obtained by calling the Plans Training and Mobilization Division, Western AATS, DSN 853-2543 or commercial 602-267-2543.

CSM List is assigned to the Western ARNG Aviation Training Site, Marana, AZ.

PIN: 069790-000

Robert C. Sherry

1940s

Accepted in September 1941, the L-4 Grasshopper was the principal observation aircraft used by Army Aviation throughout World War II. It saw action in the Pacific and the November 1942 invasion of North Africa.

1950s

Procured in early 1952, the H19 Chickasaw helped halt a major breakthrough of Communist forces during the last days of the Korean War. Affording invaluable support, the aircraft transported ammunition to United Nations' batteries.

Jeffrey S. Boyer

Robert C. Sherry

1960s and 1970s

The UH-1 Huey, the Army's first turbine-operated helicopter, became the "Workhorse" of the Vietnam conflict. Moving troops and cargo, the aircraft picked up the role of the OH-13 Sioux "Angel of Mercy" helicopter of the Korean War.

50th anniversary of ARMY AVIATION

1942 – 1992

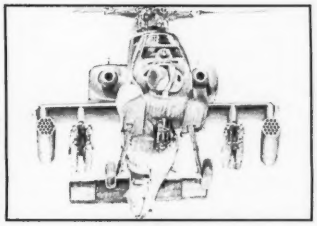
From its inception in 1941, Army Aviation has played a progressively increasing role on the battlefield. As we know it today, Aviation is an integral member of the ground commander's combined arms team.

Robert D. Sloan

1980s

Deploying to Panama in 1988, as part of Operation Urgent Fury, the UH-60 Black Hawk supported the U.S. mission to place security forces to protect U.S. facilities/installations there. Thereby, the aircraft expanded the airmobility role of Army Aviation.

Coming in the May-June 1992 issue of ***Army Aviation Digest***: The 50th Anniversary of Army Aviation—From L-4 Grasshopper to RAH-66 Comanche.



Fredric M. Martin

1990s

The AH-64 Apache played a vital role in the air campaign against Iraq during Operation Desert Storm/ Desert Shield. One of the first weapons systems to see battle, the aircraft demonstrated the deployability, versatility, and lethality of Army Aviation.